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IMPERIAL MYCOLOGICAL INSTITUTE 20 JULY 1939

TROPICAL DISEASES BULLETIN

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Issued under
the Direction of the
Honorary Managing Committee of the
BUREAU OF HYGIENE AND TROPICAL DISEASES,
Keppel Street, London, W.C.1.

Price 2/6 Net.] *Entered as Second Class Matter in the U.S.A. Post.* [Annual Subscription 21/-, With Supplement 25/-.

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TROPICAL DISEASES BULLETIN.

Vol. 36.] 1939. [No. 7.

SUMMARY OF RECENT ABSTRACTS.

VI. PLAGUE.*

Epidemiology.

MEYER *et al.* (p. 212) as a result of experience with a patient with long-standing plague considered that even healthy persons may be carriers of plague bacilli for considerable periods.

CAMPBELL (p. 750), discussing an epidemic of plague in Mwanza, found that it commenced after the relative humidity had risen above 80 per cent. for 20 days. The epidemic continued for 12 weeks, during which the relative humidity remained over 80 per cent. and it ceased 14 days after the relative humidity had dropped below 80 per cent.

HOPKINS (p. 751) considers that there is no proof that the cotton trade in Uganda is a special agency for the dissemination of plague. [See this *Bulletin*, 1935, Vol. 32, p. 845.]

In Madagascar ROBIC (p. 208) reports that pneumonic plague is common and that the tendency to pulmonary localization appears to be related to climatic conditions. Direct contagion occurs when the temperature does not exceed 15°C. Seasonal conditions affect the vitality and multiplication of *Xenopsylla cheopis*. Sporadic development in isolated cases without apparent relation is frequent. No healthy carrier has been seen. SOREL (p. 206) records similar opinions.

Aetiology.

PETRAGNANI (p. 756) gives details of the method of diagnosis of plague in rats by spleen smear, and cultures from the spleen, bone marrow or brain. *P. pestis* is polymorphic and grows at 10°C. It will not grow on agar media on which *P. pestis* has already been grown and which have been melted and reconstituted with water; it gives the nitrous acid reaction with sulphanilic acid and naphthylamine, and produces fatal septicaemia in guineapigs when instilled into the eye.

BEZSONOVA *et al.* (p. 213) in 200 strains of *P. pestis* found five which showed spontaneous transmutation into strains showing no difference from *P. pseudotuberculosis rodentium* but which differed entirely from the S and R variants of *P. pestis*. The change appeared to be stable.

* The information from which this series of summaries has been compiled is given in the abstracts made by the Sectional Editors in the *Tropical Diseases Bulletin*, 1938, Vol. 35. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

Transmission.

Rats.—In the Annual Medical Report for Malta for 1936 (p. 205) it is stated that *R. norvegicus* is the principal rat found and was infected in a recent epidemic. Breeding takes place in heaps of refuse collected for composting into manure.

The Eastern Bureau of the League of Nations (p. 746) consider that transmission by rat immigration, for instance in carts carrying rice in India, has not been proved.

Sokhey and Chitre (p. 204) found that the percentage of deaths in 80 plague rats from different areas and inoculated with standard doses of plague bacilli was inversely proportional to the human mortality in these areas. The cause of this immunity was not apparently due to a benign epizootic or to hereditary transmission, and it is probable that different degrees of susceptibility exist in different races of *R. rattus*, and that the susceptibles have died out. Taylor (p. 203) shows that plague in India is not now so important as it used to be. This may be due to immunity, which has been proved experimentally to exist in the rat population. This immunity is roughly proportionate to the prevalence of plague in the areas concerned. The transmission of plague is through house epizootics in *R. rattus*.

Girard (p. 207) states that *R. rattus* and *R. alexandrinus* are the reservoirs of plague in Madagascar, and that *X. cheopis* is the flea concerned. Robic (p. 209) adds *R. frugivorus* to this list and states that sylvatic plague probably does not exist in Madagascar. Ohtomo *et al.* (p. 753) found that *R. r. alexandrinus* was the most common rat in the Customs jetty and warehouses in Kobe and on board ships, but in the city *R. norvegicus* is the commonest. They therefore conclude that in the Customs sheds 70 per cent. of rats probably come from ships and 30 per cent. from shore.

Nazareth (p. 756) considers that the musk rat is a carrier of plague fleas and bacilli and is itself susceptible to plague.

Other Rodents.—Wassilieff (p. 209) states that all Tunisian rodents are susceptible to varying extents. Fleas probably may transmit plague from man to wild rodents though not commonly in country districts. Sylvatic plague may occur in zones near towns if contact is established between wild and urban rodents. Fourie (p. 751) in South Africa states that human plague was confined to ports and railways until 1914, when an outbreak of pneumonic plague occurred on an isolated farm. Plague is now endemic, and two groups of rodents are responsible, the gerbille (*Taterona* and *Desmodillus*) and the multimammate mouse (*Mastomys coucha*). The latter is incriminated. It occupies infested nests of gerbilles when these have died out, and also enters human dwellings. Human outbreaks are therefore limited to the range of these mice, but the gerbille is the main reservoir of sylvatic plague. In towns the domestic rats are the danger, and there is no direct contact between them and the wild rodents. In towns, therefore, rat harbourages should be eliminated rather than measures taken against wild rodents. The Annual Medical Report for Basutoland for 1936 (p. 748) shows that an epizootic in gerbilles was associated with a small human epidemic.

Phlèng (p. 754) thinks that the considerable mortality found in cats kept in Cambodia to check the invasion of houses by rats was probably due to feline plague.

PUBLIC HEALTH REPORTS, Washington (p. 210) states that the first positive evidence of plague in wild rodents of Washington State was found by the mass inoculation of fleas and lice from *Citellus townsendi*. Furthermore, fleas, ticks and lice stored in the icebox produce typical plague when injected into guineapigs after 10 months.

MEYER (p. 201) in the United States warns against contact with wild rodents, especially by handling sick or dead rodents—squirrels, marmots, chipmunks and prairie dogs. These Sciuridae and certain mouse and rat species have spontaneous plague. He gives the mode of diagnosis by the large-pool flea method. CUMMING (p. 753) records 5 human cases of plague in the U.S.A. in 1937 and 105 in the rodents mentioned by MEYER.

The Surgeon General of the United States of America (p. 746) reports that seven species of ground squirrels have now been found to harbour plague, including *Citellus beecheyi fisheri*, *C. grammurus* and *C. townsendi*. The tree squirrel and the rodents mentioned by MEYER also contract infection.

In the Argentine DE LA BARRERA (p. 211) reports that two main types of rodents are concerned in epizootics of sylvatic plague, cuis (including the genera *Cavia*, *Galea* and *Microcavia*) and *Graomys griseoflavus*. These are not domestic in their habits, their fleas are not of common kinds and little is known about them. A connexion was established between a small epidemic of human plague and a severe epizootic in *Graomys griseoflavus* which had been found in human dwellings under the stress of hunger. It is not, however, possible to say what is the degree of danger to man.

DE ARAUJO (p. 210) states that cats are susceptible to *P. pestis* by scarification or inoculation but not by feeding in the absence of trauma of the mouth or the intestinal mucosa.

Fleas.—SAUTET (p. 755) discusses the factors determining proliferation or destruction of fleas, including seasonal changes, humidity, nourishment and temperature. Fleas completely blocked die, those incompletely blocked may live for a long time and are dangerous, those not blocked are not a source of much danger.

In Malta (p. 205) the mouse flea *Leptopsylla musculi* and *X. cheopis* are more common than *Nosopsyllus fasciatus*.

ADVIER (p. 210) investigated *Synosternus pallidus*, a common flea of Senegal, which, however, has little opportunity to ingest plague bacilli, and even if it does so it does not appear to be very capable of transmitting the disease. FOURIE (p. 751) thinks that the primary epizootics in South Africa are apparently spread by *Dinopsyllus lypusus*, *X. eridos* and *Chiastopsylla rossi*. *X. brasiliensis* found in the multimammate mouse probably spreads plague to man.

GIRARD (p. 207) in the Madagascar highlands found that *X. cheopis* remains infective for several weeks after rats have disappeared, and thereafter will feed on man. In this way plague may be transmitted for considerable distances by the transport of fleas. Fleas in paddy, rice dust of huts, may have to obtain their first blood meal from man. If man has the septicaemic form fleas may thus infect local rats, and this forms the basis of the reversal of the usual cycle into a cycle man-flea-rat. SOREL (p. 206) and ROBIC (p. 209) state that in Madagascar *X. cheopis* is the important transmitting flea. It is also the principal flea in India, though *X. brasiliensis*, according to TAYLOR (p. 203) may be

important in the Deccan. *X. astia* is negligible. This author discusses the effect of climatic factors on fleas.

OHTOMO *et al.* (p. 753) found that the flea counts in the Customs sheds at Kobe were 75·62 per cent. *X. cheopis*, and 21·07 per cent. *N. fasciatus*. The *cheopis* index of 4·2 deserves serious attention. Counts in Tokyo were only 0·01 *X. cheopis* and in Kobe city 5·73.

ESKEY (p. 754) in the United States tested the ease with which fleas, rats, and rodents contracted infection and their relative powers of transmission. *X. cheopis* was the most easily infected flea, less so were *N. fasciatus* from rats, *Diamanus montanus* and *Hoplopsyllus anomalus* from ground squirrels. Transmission by *X. cheopis* was much more effective than by the others. Infected fleas which do not show blockage of the proventriculus do not seem to be infective by bite, and the bites of most infected fleas are infective for a short time only, probably 1 to 2 days, but fleas may be infected and live for months, except *X. cheopis* the average life of which was 16 days. Therefore it is possible that infection may be carried through months when the rodents are hibernating. When the plague bacillus is established in the gastro-intestinal tract of the flea it continues to exist until the death of the flea. Parasites concerned in sylvatic epizootics are rather inefficient compared with those of the rat and human infections.

SASSUCHIN and TICHOMIROVA (p. 215) found that plague bacilli could be isolated after 6–10 days in larvae and nymphs of the tick *Dermacentor silvarum* fed on infected guineapigs, but that the bacilli could not be transmitted from the larva stage to the nymph stage.

MERTENS (p. 755) found that *Triatoma rubrofasciata* cannot transmit plague by bite directly except immediately after an interrupted meal on an infected animal. As it may harbour plague bacilli for at least a month, however, it may be dangerous to man if crushed on the skin and the bacilli rubbed into the bite.

Clinical, etc.

FIMAYER (p. 212) reports a patient with a submaxillary bubo in an epidemic of pulmonary plague. Entrance was probably through the conjunctiva or the upper air passages. MEYER *et al.* (p. 212) report the case of a boy of 10 from a ranch in a sylvatic plague area, with an axillary bubo proved to contain *P. pestis*, and meningeal symptoms which relapsed. Plague encephalitis and meningitis were found post mortem. They consider that recent cases of plague from the western States reflect the behaviour of an agent which causes mild infections with a tendency to latency.

In the Annual Report for Basutoland (p. 749) it is noted that in an outbreak blood culture revealed *P. pestis* although there were no glandular enlargements.

In Madagascar GIRARD (p. 208) states that 95 per cent. of plague cases are only recognized after death, and that diagnosis is by lung and liver puncture. In Java ROSIER (p. 748) uses spleen puncture for post mortem diagnosis.

KAMAL (p. 752) describes the functions of "Health Agents" in Egypt, who are responsible for certification of deaths. If acute disease is suspected they are required to puncture heart, apex and base of lungs and liver of cadavers to obtain material for cultures and smears and to fill capillary tubes for despatch to laboratories.

Treatment.

NORMAN-WALKER (p. 213) finds that treatment by serum from human convalescents from plague in whom syphilis, tuberculosis and malaria are excluded, in doses of 20 cc. on 3 consecutive days, usually brings the temperature to normal. A mortality of 16·7 per cent. was found in 48 patients thus treated against 47·9 per cent. in 48 untreated. Arrangements are being made to store the serum. SOREL (p. 207) uses specific treatment by serum and bacteriophage but results with the latter intravenously, subcutaneously or into the bubo do not greatly differ from the results obtained by serum alone.

CARMAN (p. 757) in East Africa found that 3 of 6 patients recovered with intramuscular prontosil (5 cc. or 2½ cc. twice daily) whereas all the previous nine (who had not been treated with prontosil) had died.

Prevention.

In Malta (p. 205) a systematic anti-rat campaign is advocated together with a proper service for collection and disposal of all refuse. In Egypt KAMAL (p. 752) shows how great are the opportunities for rat nesting in matting roofs of houses. Nothing short of demolition and the building of rat-proof houses will keep plague away.

ROSIER (p. 748) shows that a reduction in the plague epidemic in Java has taken place along with the continued house improvement campaign. [For the effect of this campaign on the malaria position reference should be made to ROSIER, this *Bulletin*, 1938, Vol. 35, p. 417, and GROOTINGS, *ibid.*, p. 902]. Altogether 1,383,363 houses have so far been improved.

TAYLOR (p. 204) in India states that the construction of rat-proof grain stores in towns is the only permanent measure taken. Temporary measures include (1) vaccination, (2) evacuation, (3) rat destruction, (4) disinfection, (5) control of grain traffic. Vaccine has been improved and field trials will be made and evaluated. In rat destruction trapping is of limited value. Poison baiting is easier, with pills of 3 grains of barium carbonate in a paste of flour freshly made daily. Cyanide gas fumigation is increasingly popular. The same points are brought out in the Annual Report of the Eastern Bureau of the League of Nations (p. 746), which also mentions general sanitation, isolation and treatment of patients, regular collection and examination of fleas and anti-plague propaganda.

CAMPBELL (p. 750) describes the routine adopted for plague workers on entering infected houses in Mwanza. The workers enter behind an anti-flea barrage of spray, and their arms and legs are sprayed. Anti-rat measures are most effective if carried out in the plague off-season because this kills off the rat-cause of carry-over to the next season. The author does not consider carry-over by infected blocked fleas or bacilli in dust or fomites to be important.

GILLES (p. 213 and 214) gives the technique of the fumigation of the cargoes of lighters with liquid HCN which is effective and not dangerous if reasonable care is exercised. The abstract cannot be summarized further.

SCOTT (p. 201) states that rodent destruction on the Witwatersrand is carried out by (1) gassing burrows near dwellings and farms, (2) poisoned grain in open areas, (3) traps on premises where foodstuffs are stored. These measures have been successful. In Basutoland (p. 749) the campaign against gerbilles was started by baiting every burrow in an area 150 miles long by 6 to 10 miles wide. This was

successful and the gerbilles were practically wiped out. The work, however, needs to be continued.

For pulmonary plague SOREL (p. 207) and ROBIC (p. 209) in Madagascar consider that the only effective method of prevention is to isolate all those exposed to infection. Masks and spectacles must be worn and regular inspection made of these contacts to ensure early diagnosis. GIRARD (p. 208) states that isolation for 10 days is necessary since the incubation period may be up to 9 days. These procedures are efficacious.

ALBORNOZ (p. 747) studied the occurrence of plague in Rosario (Argentine) since its introduction in 1899. From 1900 to 1937 there were 703 cases of human plague in Rosario with a mean mortality of 35·27 per cent. Only in the last 8 years have measures been highly satisfactory, when disinfection and vaccination gave place to active deratization. From 1930 to 1937 only 14 cases have been reported. FONTENELLE (p. 758) shows that during 1929–1936 plague disappeared completely from Rio de Janeiro, with continuation of building improvement and active rat destruction. ALFARO (p. 747) states that anti-plague measures in the Argentine, although difficult to carry out, have been followed by a noteworthy decrease of plague, and the figures of cases have fallen from 1,178 in 1919 to 31 in 1936.

Vaccination.—REITANO (p. 215) states that not every avirulent living strain of *P. pestis* possesses immunizing power, and found that desiccated *P. pestis* (from which cultures could be obtained up to 30 months) showed no immunizing power, and was therefore useless as a vaccine. PIRIE and GRASSET (p. 757) in experimental work show the superiority of living over killed vaccine. Similarly serum prepared from animals inoculated with living vaccine was capable of saving the lives of 2 of 6 infected animals treated with it, but six others treated with serum prepared from animals vaccinated with dead bacilli all died. SOREL (p. 207) states that the live vaccine of avirulent E. V. strain used in Madagascar is preferred to a dead vaccine, and GIRARD (p. 208) and ROBIC (p. 209) also mention E. V. and show that the mortality figures have fallen since its introduction. OTTEN (p. 757) is convinced that the only successful vaccine must be a living one prepared from avirulent strains of high antigenic potency, and quotes figures of an alternate-case field trial he made, the results of which show the value of his vaccine in a striking manner. In the preparation of a vaccine it is essential that antigenic potency must be preserved, and he advises deep-stab culture at 4–6°C. for producing variants which lose virulence without impairing immunizing properties. ROSIER (p. 748) reports that this live avirulent vaccine of OTTEN has been used in the affected areas of Java on 2,363,642 individuals. Excellent results were obtained, and the present decline of the epidemic is attributed chiefly to this prophylactic measure.

CAMPBELL (p. 750) found that mass inoculation [presumably with dead vaccine] did not seem to have any affect in stopping the Mwanza outbreak, modifying the illness or reducing the chances of acquiring infection. It did, however, allay panic.

On the other hand the report of the Haffkine Institute (p. 200) discusses vaccines of dead bacilli with the following conclusions: (1) Broth vaccines incubated at 27°C. are more potent than those incubated at 37°C. (2) The reverse is the case with agar grown vaccines, probably owing to the larger organisms produced at 37°C. (3) Broth-grown heat-killed vaccines from virulent cultures at 27°C.

are superior to live avirulent vaccines grown at either 27°C. or 37°C. (4) In broth vaccines heat-killed vaccine incubated at 27°C. is the most potent; live avirulent vaccine grown at 37°C. the least potent. In agar vaccine from the same strains live avirulent vaccines incubated at 37°C. were the most potent and heat-killed vaccines incubated at 27°C. the least. (5) The method of killing the vaccine grown at 37°C. does not seem to matter, but in those grown at 27°C. killing at 55°C. for 15 minutes gives a much more potent vaccine than at 60°C. for one hour. (6) Stored at 4°C. heat killed vaccines show no measurable loss of potency for months. Live avirulent vaccines, on the other hand, deteriorate so rapidly that it would be impossible to issue them from a central laboratory for effective use in so large a country as India. *C. W.*

LEPROSY.

Précis of Abstracts in this Section.

Muir (p. 531) advises the appointment of a whole-time leprosy expert for East Africa and commends the voluntary system to attract patients without compulsion.

Tolentino (p. 531) considers resistance to be a dominant and susceptibility a recessive character and that they are transmitted in Mendelian fashion. Hayashi (p. 531) thinks that a shift of incidence to the later years of life is an indication of a decline of the disease, as in Norway.

Joseph (p. 532) finds that hot humid climates are favourable and high altitudes with low vapour tension unfavourable, to the spread of leprosy in India. Poverty and various customs play a part. Oberdörffer (p. 532) shows that the highest incidence in Ceylon is round Colombo and other towns of the south-west and east.

Piñero Garcia (p. 532) states that incidence in Rosario has risen from 1 to 2·5 per 10,000 in the decade 1927–37.

MacNaughton (p. 532) describes leprosy in Fiji. Intramuscular iodized chaulmoogra oil is the usual treatment.

Strachan (p. 533) states that 61 per cent. of early untreated N1 cases appear to have undergone spontaneous arrest in Basutoland.

Doull (p. 533) shows that the maximum attack rate (of 4·1 per 1,000) occurs between the ages of 10 and 14 at Cebu in the Philippines and that the annual risk of contracting infection is about 5 times as high in persons with house contact as in the ordinary population. At Culion, Lara (p. 533) observed that in child contacts, areas of skin which are most frequently in contact with parents—arms, legs and buttocks—are usually first found to be infected. In some instances the first lesions were small weal-like or papular spots, usually bacteriologically positive.

Lowe and Chatterji (p. 534) think that leprous lesions arising at the site of scarification or tattooing may originate from contamination of the instruments, but that more commonly a leprous infection is latent at the time of the injury.

Leitner (p. 534) discusses the bone lesions in leprosy.

Cassiano (p. 535)shows that the leprous reaction, though occasionally closely simulating true erysipelas, differs from it in that it occurs only

where there are cutaneous lesions of leprosy and is mild, not infective and not associated with a streptococcus. GUILLAUMOU (p. 535) reports the leprous reaction following Jennerian vaccination in 11 patients.

DEGOTTE (p. 535) and DUBOIS and DEGOTTE (p. 535) found that if Tr. Iodi is applied to lesions, allowed to dry and then covered with starch powder, sweating either from muscular exercise or pilocarpine injection, will produce a blue colour. This test they found to be valuable in suspected cases, lack of power to sweat being shown in 42·26 per cent.

RADNA (p. 536) states that gland puncture showed acid-fast bacilli in 24·5 per cent. of a series of lepers and in 4·8 per cent. of non-lepers, but in 2 of the latter 5 positives the bacilli were atypical and easily distinguished from *Myco. leprae.* VAN BREUSEGHEM (p. 536) found leprosy bacilli in 20 per cent. of treated and 40 per cent. of untreated cases by examining mucus from both nostrils. NAIR and PANDALAI (p. 536) found acid-fast bacilli in the lesions of 57·27 per cent. of 147 neural cases. [See also DES ESSARTS below.]

RADNA (p. 536) shows that blood lipase is low in severe leprosy and increases as patients improve under treatment. SPEIGHT (p. 537) found the blood sedimentation rate to be a good index of prognosis if the influence of intercurrent disease is excluded.

GREVAL *et al.* (p. 537) found the complement fixation test with the Witebsky, Klingenstein and Kuhn antigen, to be sensitive in the nodular type but less so in the nerve type. The test is not specific. ROW (p. 537) obtained a strong reaction in all cutaneous cases with a complement fixation reaction employing a preparation made by prolonged autolysis of tubercle bacilli. FICKER (p. 537) uses an antigen prepared from cultures of acid-fast bacilli in a flocculation reaction which he reports to be positive in a larger proportion of nerve cases than is usual with similar tests and (p. 538) uses Calmestrol for strengthening weak complement fixation reactions.

CAPPELLI (p. 538) found that the Pallida reaction is negative with the sera of non-syphilitic lepers.

BURNET (p. 538) finds the leprolin reaction to be positive in nerve cases and a large proportion of contacts but negative in cutaneous leprosy and infancy. Its significance is not understood.

ROUSSEAU and GAUGEAT (p. 539) claim to have cultivated *Myco. leprae* from a leproma in a fluid Aspergillus medium. MANALANG (p. 539) reports increase in the proportion of non-acid-fast forms of leprosy bacilli (believed to be degenerated) in lesions treated with *H. wightiana* preparations. He also (p. 539) found the Culion Mercado preparation to be the most effective in causing the disappearance of *Myco. leprae* from gland tissue kept in test tubes, but *wightiana* oil and esters the most effective in removing acid-fastness.

BURNET (p. 539) records the successful infection of one of a series of hamsters with human leprosy. The spleen had not been removed.

MARCHOUX and CHORINE (p. 540) consider that the smallest lesions of the skin permit the entry of leprosy bacilli, which can also penetrate healthy mucous membranes. The bacilli are spread by leucocytes. DES ESSARTS (p. 540) believes that leprosy bacilli may be eliminated from the skin of patients with so-called closed leprosy, and that these patients may therefore be a danger to others. JEREMIAH and BARTHOLOMEUSZ (p. 540) also consider that patients with neural leprosy are potentially infective and should be segregated. *C. W.*

Leprosy Review. 1939. Jan. Vol. 10. No. 1. pp. 1–102. With numerous illustrations.—**East African Number.**

This important issue contains reports by Dr. E. Muir on his 1938 tour in East Africa. The recommendations based on the conditions found necessarily contain much repetition, but the following points are of especial importance, although most of the information is of local interest.

He confirms the high incidence of leprosy in the north-east of the Belgian Congo, and extending to Uganda and the Equatorial Province of the Sudan. In the Kenya uplands it is less prevalent than on the coast and in Tanganyika. The severity, however, does not correspond with the incidence; this he attributes to the widespread infection involving even those with higher degrees of natural resistance, who develop a mild form. In the Congo extensive surveys are being made by the Belgian Croix Rouge, and in British Territories much anti-leprosy work is carried out by missionary bodies with funds chiefly supplied by Government or Native Administrations.

His main recommendations are firstly the supply of a whole-time expert to tour round the leprosy institutions giving advice on the best preventive measures and on treatment. Next he supports the voluntary system to attract the patients, and he notes that compulsion is nearly everywhere being done away with in our possessions. Out-patients clinics may be of value where the patients are well-nourished and when the patients can be followed up to their homes and contacts examined. The abandonment of compulsion in Zanzibar resulted in an improved morale and no diminution of numbers. As usual, occupation therapy is stressed, as well as education of the patients. In addition to East Africa, Malta and Aden are reported on.

L. Rogers.

Tolentino (Jose G.). **The Rôle of Heredity in the Transmission of Leprosy.**—*Monthly Bull. Bureau of Health.* Manila. 1938. June. Vol. 18. No. 6. pp. 261–272. [12 refs.]

This paper discusses the rôle of heredity in the transmission of leprosy on the lines of Mendel's law. The author considers that resistance and susceptibility may be transmitted to the offspring to a great extent according to that law. Resistance appears to be the dominant and susceptibility the recessive characteristic. The resistant persons are immune under any conditions of exposure to infection, but a slight amount may infect a susceptible one. Not all the children of lepers are susceptible, and adult infections are possible. He concludes that susceptibility and resistance to leprosy are very likely hereditary.

L. R.

Hayashi (Fumio). **The Age Distribution Curve in Leprosy.**—*Internat. Jl. Leprosy.* Manila. 1938. Oct.–Dec. Vol. 6. No. 4. pp. 491–496. With 9 figs.

The data for four censuses in Japan are analysed. In leprosaria cases the age distribution is low and approaches the curve of the age of onset. A shifting of the age curve to a later period indicates a late stage or a decline of the disease, as illustrated by Norway. The

fact that the number of lepers found at the censuses does not decrease proportionately to those among military conscripts is partly explained by a rise in the age of the curve for the whole country.

L. R.

JOSEPH (J. J.). **Factors influencing the Incidence of Leprosy in the Madras Presidency.**—*Leprosy in India.* 1939. Jan. Vol. 11. No. 1. pp. 3–13. With 1 map.

The author discusses the incidence of leprosy on the basis of records of over 400 leprosy clinics at which within nine years some 200,000 cases have been recorded. The census returns from 1871 to 1921 showed almost stationary figures among an increasing population; but in the decade to 1931 the population increased 10 per cent., and the leprosy figures 100 per cent., due to increased interest in the disease. A map shows the chief foci of infection in the north-east coastal and the southern central areas. This confirms the higher incidence in hot humid climates. High altitude and low vapour tension are unfavourable to the spread of leprosy. Caste and marriage customs help to spread the disease. In schools and colleges the highest incidence is among those below the age of 12 years. The poor depressed classes, who live under bad sanitary conditions, have a high incidence.

L. R.

OBERDÖRFFER (Manfred). Moderne Leprabekämpfung in Ceylon. [**Leprosy in Ceylon.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1938. Dec. Vol. 42. No. 12. pp. 550–552. With 1 fig. (map).

This brief paper illustrates by a map the incidence of leprosy in Ceylon. It brings out the high incidence in the south-western part of the island and a smaller area on the east coast. The highest rates of from 5 to over 10 per 10,000 population were met with around the towns of Colombo and Galle and those of the east coast. *L. R.*

PIÑERO GARCIA (Pedro P.). Endemiografía de la lepra en Rosario. [**Leprosy in Rosario.**]—*Prensa Méd. Argentina.* 1938. Nov. 30. Vol. 25. No. 48. pp. 2233–2247. With 6 diagrams. [16 refs.]

[There are many Rosarios, but the one referred to here seems to be in Córdoba, Argentine Republic.] The article gives a good deal of information but mainly of local interest, and to a great extent dealing with the history of the disease and its spread during the past decade. In 1927 there were 1,111 known lepers in the Argentine, when the population was 10,639,338, or 1 per 10,000. Since then the rise has gone on unchecked till in 1937 the number was 3,286 among a population of 12,761,611 or 2·5 per 10,000. Details of the 1928–29 census of lepers are given, stating the nationality, age, sex, place of residence and type of disease. The mortality during the decade is presented in a series of graphs. Doubtless there are other patients who have escaped notification. *H. H. S.*

MACNAUGHTON (W. G.). **Report on Central Leper Hospital, Makogai.**—*Fiji Ann. Med. & Health Rep. for Year 1937.* pp. 41–44.

At the end of 1937, 577 patients were accommodated in the Fiji leper institution, of which this is the annual report. Cases are being

received in an earlier stage than formerly, especially in Fijians, and the majority are cutaneous ones, chiefly among the Indians. Iodized chaulmoogra oil intramuscularly is the usual and the most painless treatment. Methylene blue on the whole has not been followed by marked improvement. Among 560 treated patients 161 became arrested or quiescent for from six months to two years, and 233 more were improved. Of the 161 the neural type formed 70 per cent. About four and a half gallons of chaulmoogra oil were produced from trees grown on the island. Work is provided and about £1,000 worth of produce was purchased from the patients. The settlement is a credit to Fiji. *L. R.*

Innes (James Ross). **A Leprosy Survey in the Island of Malaita, British Solomon Islands.**—*Internat. Jl. Leprosy.* Manila. 1938. Oct.–Dec. Vol. 6. No. 4. pp. 501–513. With 3 figs. (2 maps).

This is a fuller account of the work recorded in *Leprosy Review* [see this *Bulletin*, 1938, Vol. 35, p. 882]. *L. R.*

Strachan (P. D.). **Statistical Evidence indicating the Predominance of Abortive or Stationary Leprosy in Basutoland.**—*Internat. Jl. Leprosy.* Manila. 1938. Oct.–Dec. Vol. 6. No. 4. pp. 497–499.

This paper reports the results of further surveys in Basutoland, and shows the existence of a large number of abortive cases. Statistics are given to indicate that a large number of early neural cases tend either to remain stationary or to abort. During ten years 61 per cent. of early untreated N1 cases appeared to undergo spontaneous arrest.

L. R.

Doull (James A.). **The Importance of Field Studies of Leprosy, with Especial Reference to the Risk of Household Exposure.**—*Amer. Jl. Hyg.* 1939. Jan. Vol. 29. No. 1. Sect. A. pp. 27–33.

This is an interesting account of field studies of leprosy at Cebu in the Philippines. "The results are most clearly expressed as attack rates per unit (usually 1,000) of person-years of experience; that is, the number of cases per 1,000 persons observed for one year." The records deal with 8,007 individuals of 1,051 families. Living in a house with a leper for one month constitutes exposure to infection. The attack rates averaged 1·3 per 1,000 person-years, with a maximum of 4·1 between 10 and 14 years of age, and falling to 0·2 at over 50 years. The annual risk of contracting the disease is about five times as high with as without house exposure, the figures being 5·1 to 0·9. The highest rate of 14·8 to 2·1 was again from 10 to 14 years of age. The rate among exposed persons was 5·0 in males and 4·1 in females. No account was taken of the duration of house contact with a leprosy patient or of the type of the cases. *L. R.*

Lara (C. B.). **Early Leprosy in Children of Lepers; Further Observations on the Early, Definitely Identifiable Leprotic Lesions.**—*Monthly Bull. Bureau of Health.* Manila. 1938. July. Vol. 18. No. 7. pp. 325–355. With 5 figs.

This paper deals with further work in watching for the earliest stages of leprosy in children of lepers under close observation at the

Culion settlement. The material included 629 children of nearly equal sex incidence, the majority of whom had been studied for at least a year. Since November 1934, 35 new cases with definite or probable leprotic lesions have been found, of which details and a tabulated summary are recorded. The lesions were first found most frequently on the lower extremities, upper extremities and buttocks; less frequently on the trunk and face. These are the areas that most frequently come into contact with the source of infection in the parents. The average of the first appearance was $19\frac{4}{5}$ months. The most interesting observation is that in 14 of the cases the first observed lesions were small single or multiple weal-like and papular spots, the majority of which were positive on bacteriological examination. The 35 cases showing infection within the first three and a half years of life among the 629 represent only a fraction of the actual incidence in that age group, as only a few of them had reached the age of three.

L. R.

Lowe (John) & Chatterji (S. N.). **Scarification, Tattooing, etc. in Relation to Leprous Lesions of the Skin.**—*Leprosy in India.* 1939. Jan. Vol. 11. No. 1. pp. 14–18. With 9 figs. on 4 plates.

This note records and illustrates cases in which leprous lesions appeared at the site of a scar due to scarification, tattooing or vaccination. The authors think that the disease may possibly be occasionally transmitted by instruments used for those purposes, but that more commonly a leprous infection is latent at the time of the injury. Leprous lesions are frequently treated by scarification, tattooing and the application of the cautery or caustics. *L. R.*

Leitner (A. J.). Les osteo-arthropathies lépreuses du pied. [**Leprotic Osteo-arthropathy of the Foot.**]—*Internat. Jl. Leprosy.* Manila. 1938. Oct.–Dec. Vol. 6. No. 4. pp. 471–476. With 9 figs. on 3 plates.

This paper deals with the subject of bone lesions on the usual lines. In addition to the removal of dead bone and amputations in advanced crippling lesions, the author discusses the rôle of involvement of the sympathetic periarterial system and decalcification of bone. *L. R.*

Motta (Joaquim). Lèpre tuberculoïde. Manifestations cliniques. [**Tuberculoid Leprosy.**]—*Rev. Brasileira Leprologia.* S. Paulo. 1938. Dec. Vol. 6. No. 4. pp. 387–399. With 14 figs. on 4 plates.

Portugal (H.). Histologie pathologique de la lèpre tuberculoïde. [**Pathology of Tuberculoid Leprosy.**]—*Ibid.* pp. 401–411. With 8 figs. on 4 plates. [15 refs.]

The first of these papers describes the clinical features of tuberculoid leprosy as seen in Brazil. The second deals with the histological changes; both are illustrated. They contain nothing new. *L. R.*

Tisseuil (J.). De l'évolution et de la classification de la lèpre tuberculoïde. [**Classification of Tuberculoid Leprosy.**]—*Bull. Soc. Path. Exot.* 1938. Nov. 9. Vol. 31. No. 9. pp. 803–806.

Dusan (J.), Lombard (R.) & Tivollier. Maladie de Hansen, forme nerveuse avec léprides érythémato-circinées. [**Erythemato-Circinate Leprosy.**]—*Marseille-Méd.* 1938. Oct. 5–15. Vol. 75. Nos. 28–29. pp. 382–384.

Roger (H.), Boudouresques (J.) & Lombard (R.). Maladie de Hansen achromique révélée par une paralysie cubitale attribuée à un traumatisme. [**Leprosy revealed by Paralysis attributed to Trauma.**]—*Marseille-Méd.* 1938. Oct. 5–15. Vol. 75. Nos. 28–29. pp. 393–395.

Sambuc (Edouard). Notes sur la lèpre dans la province de Bac-Lieu (Cochinchine). Nécropsie de deux lépreux. [**Two Autopsies in Leprosy.**]—*Rev. Méd. et Hyg. Trop.* 1938. Sept.–Oct. Vol. 30. No. 5. pp. 253–260.

Cassiano (Tupy Pereira). Reacção leprotica erysipelatoide. [**Erysipelatoid Leprotic Reaction.**]—*Rev. Brasileira Leprologia.* S. Paulo. 1937. Vol. 5. Special No. pp. 321–327.

The leprous reaction may at times—the author gives notes of sixteen examples—take on characters resembling true erysipelas. General systemic upset is evidenced by fever, 38°–40°C., anorexia, occasionally nausea and vomiting, prostration, and locally there is an erythematous, swollen, oedematous patch with pain, greatly aggravated by pressure and heat; in 6–12 days desquamation occurs. Differences from true erysipelas are that, though commonly on legs and face and rarely on the arms, they occur only where there are cutaneous lesions of leprosy, they are never infective, often mild, never fatal, and not associated with a streptococcus. They clear up readily when prontosil is administered. *H. H. S.*

Guillaumou (F.). Réactions lépreuses provoquées par la vaccination jennérienne. [**Leprotic Reactions after Vaccination.**]—*Bull. Soc. Path. Exot.* 1939. Feb. 8. Vol. 32. No. 2. pp. 129–134.

After reference to earlier similar observations in Honolulu and at Carville, the author records 11 reactions of leprotic lesions of varying intensity following Jennerien vaccination of 414 inmates of a leper institution in Africa, 77 per cent. of whom were positive. *L. R.*

Bechell (Luiz Marino). Moléstias intercorrentes como causas de reação leprótica. [**Intercurrent Disturbances as Causes of the Lepra Reaction.**] —*Rev. Brasileira Leprologia.* S. Paulo. 1938. Dec. Vol. 6. No. 4. pp. 451–469. [19 refs.] German summary.

i. Degotte (J.). Les troubles de la sudation dans le diagnostic de la lèpre débutante. Réaction de Jürgensen et Milnor. [**Diagnostic Import of Sweating.**]—*Ann. Soc. Belge de Méd. Trop.* 1938. Sept. 30. Vol. 18. No. 3. pp. 419–420.

ii. Dubois (A.) & Degotte (J.). Le test à la pilocarpine dans le diagnostic des macules lépreuses. [**Pilocarpine Diagnostic Test.**]—*Ibid.* pp. 421–427.

i. The author discusses the diagnostic value of loss of sweating of the skin over leprous lesions. He points out the difficulty in demonstrating lepra bacilli in early nerve and tuberculoid lesions, and the frequent absence of loss of sensation in early tuberculoid ones. He

advocates the application to the lesions of a coating of Tr. Iodi, and after it has dried starch is sprinkled over it. On provoking sweating by muscular exercise (or according to Dubois by the injection of pilocarpine) the starch is turned blue only in the areas where sweating occurs. Its absence indicates the positive reaction of loss of the power to perspire. Positive results were obtained in 69·67 per cent. of 196 definite, but not very advanced, cases of leprosy. In suspected cases the rate was 42·26 per cent. and in slightly suspicious ones 21·05 per cent. These figures are in agreement with VAN BREUSEGHEM's 71 per cent. of reactions with the test. He therefore considers this test of JÜRGENSEN and MILNOR to be of some value in suspected cases of leprosy.

ii. This paper records very similar results with the use of pilocarpine in place of muscular exercise to produce sweating. The authors obtained 72 per cent. of reactions in simple neural lesions, 88 per cent. in tuberculoid ones, and 79 per cent. in 100 total cases. [See also this *Bulletin*, 1934, Vol. 31, p. 554.] *L. R.*

RADNA (R.). La ponction ganglionnaire de sujets sains en pays d'endémie lépreuse. [**Gland Puncture in Healthy Persons in Endemic Leprosy Areas.**]—*Ann. Soc. Belge de Méd. Trop.* 1938. Sept. 30. Vol. 18. No. 3. pp. 497–500.

The author reports on examinations of 135 lepers and 102 non-lepers for lepra bacilli by means of gland puncture. The former yielded 24·5 per cent. of positive results. The latter only 4·8 per cent., but in two of the five positive ones the acid-fast bacilli were atypical and easily distinguished from that of Hansen. *L. R.*

VAN BREUSEGHEM (R.). Contribution au diagnostic de la lèpre. L'examen du mucus nasal. [**Diagnosis by Examination of Nasal Mucus.**]—*Ann. Soc. Belge de Méd. Trop.* 1938. June 30. Vol. 18. No. 2. pp. 291–292.

The author records that he found lepra bacilli by examination of the nasal mucus from both nostrils in 20 per cent. of treated cases of leprosy; but in 40 per cent. of untreated cases. They were found on both sides in 30 per cent. only of the positive cases, so both should be examined. *L. R.*

NAIR (V. Govindan) & PANDALAI (N. G.). **A Note on the Importance of a Thorough Bacteriological Examination of All Cases of Clinical Leprosy.**—*Jl. Indian Med. Assoc.* 1938. Nov. Vol. 8. No. 2. pp. 86–90. [12 refs.]

These authors report finding acid-fast bacilli in the lesions of 57·27 per cent. of 147 neural cases of leprosy. They stress the importance of such examinations in all forms of the disease. *L. R.*

RADNA (R.). Sur la lipase du sérum des lépreux. [**Lipase of Serum in Leprosy.**]—*Ann. Soc. Belge de Méd. Trop.* 1938. June 30. Vol. 18. No. 2. pp. 233–236. [11 refs.]

The author refers to the work of ROGERS, confirmed by MUIR, showing a decrease in blood lipase in severe cases of leprosy, and an increase

in cases improving under chaulmoogra treatment. He goes on to record his own observations confirming the earlier work. Details of repeated estimations in fourteen cases show a serious decrease in lipase in severe cases as compared with that in cases doing well. In those improving under alepol treatment a notable increase in the lipase in the blood was observed. *L. R.*

Speight (A.). **Erythrocyte Sedimentation Test and Prognosis in Leprosy.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1939. Jan. 28. Vol. 32. No. 4. pp. 505–509. With 3 graphs.

The author has made regular monthly estimates of the erythrocyte sedimentation curve in cases of leprosy as advised by Muir, and divides them into three types. The prognosis is favourable when the index remains at a low point throughout, not exceeding 25; and also when a high initial rate shows a progressive fall under the influence of treatment. On the other hand, the outlook is unfavourable when a high index does not decline with treatment. Intercurrent disease and other depressing influences may increase the rate, and should also be taken into account in making a prognosis. *L. R.*

Greval (S. D. S.), Lowe (John) & Bose (R.). **Complement-Fixation in Leprosy with Witebsky, Klingenstein and Kuhn (W.K.K.) Antigen: a New Technique.**—*Indian Jl. Med. Res.* 1939. Jan. Vol. 26. No. 3. pp. 843–849.

Complement fixation tests have been carried out on leprosy cases with the Witebsky, Klingenstein and Kuhn antigen, with the technique of the Wassermann test. A high order of sensitiveness was found in the lepromatous type, but a low order in the nerve type. The specificity of the test is not of a very high order, and positive reactions have been obtained in kala azar, and doubtful ones in malaria, syphilis and tuberculosis. The diagnostic value is only considerable in the lepromatous type. *L. R.*

Row (R.). **Some Experimental Observations on Human and Rat Leprosy and their Significance in the Pathogenesis and Treatment of the Disease.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1939. Jan. 28. Vol. 32. No. 4. pp. 497–504. With 2 plates. [12 refs.]

Complement fixation tests were carried out in over one hundred leprosy cases with a preparation made by prolonged autolysis of tubercle bacilli. A strong reaction was obtained in all cutaneous cases, and negative ones in nerve cases showing no lepra bacilli. In tuberculoid cases the reaction was doubtful. *L. R.*

Ficker (Martin). Eine neue Flockungsreaktion bei Lepra. [**A New Flocculation Reaction in Leprosy.**]—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1938. Nov. 8. Vol. 94. No. 3/4. pp. 357–362.

The author describes yet another form of antigen for a flocculation reaction in leprosy. It is prepared from cultures of the acid-fast bacillus 1225 or L3 Troc by an elaborate method for which the original paper should be consulted. Flocculation with it is reported to give negative reactions in syphilis, but positive ones in leprosy. It is also said to give a larger proportion of positive results in cases of nerve

leprosy than are obtainable by any previous such test, and in a series of cases it gave positive reactions when examinations of the nasal mucus were negative. *L. R.*

FICKER (Martin). Ueber Verstärkung von Antigenen für die Komplementbindung bei Lepra. [**Antigens for Leprosy Complement Fixation Tests.**]—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1938. Nov. 8. Vol. 94. No. 3/4. pp. 363–366.

In this brief note the author reports that weak and doubtful complement fixation reactions in leprosy may be strengthened by the addition of Bayer's Calmestrol. *L. R.*

CAPPELLI (E.). La " Pallidareazione " di Gaehtgens sui sieri lebbrosi. Contributo allo studio dell'essenza della R. Wassermann. [**The " Pallida Reaction " in Sera of Lepers.**]—*Giorn. di Batteriol. e Immunol.* 1939. Mar. Vol. 22. No. 3. pp. 425–436. [18 refs.] English summary. [Summary appears also in *Bulletin of Hygiene.*]

" The ' pallidareaction ' practised on leprous sera with the technic suggested by Gaehtgens and with the spirochaetic antigen created by him allows us to conclude :—

" (1) that the specificity of the reaction is confirmed by the total absence of positive results (+++) on the sera of non-luetic lepers . . . . ;

" (2) that, as the ' Pallidareaction ' was positive (+++) only in one case, which concerned the one leper shown to be affected with lues, this fact, if proved by further researches, offers the possibility of revealing positive specific reactions for lues in lepers ;

" (3) that the humoral reactions which can be observed in sera of lepers by means of antigens consisting of extracts of sound organs and of organs of hereditary luetic individuals (positive Wassermann reaction)—even apart from the possibility of showing the existence of specific leprous antitoxins—may be compared to those of luetic sera only in the aspecific component with regard to the fact that this reaction remains negative toward an antigen formed only by Treponema pallidum . . . . . "

BURNET (Et.). La réaction à la léproline chez un groupe lépreux en Tunisie. [**Leprolin Reactions.**]—*Arch. Inst. Pasteur de Tunis.* 1938. Dec. Vol. 27. No. 4. pp. 341–359.

Leprolin reactions in cases in Tunis are recorded which are in close agreement with those of previous observers. The reaction is negative in infancy and in cutaneous cases of leprosy. It is positive in nerve cases, and in large proportion of contacts, especially those of the later ages. It is not certain if the reaction is a measure of immunity or an allergic phenomenon. *L. R.*

COWDRY (E. V.). **Cytology of Leprosy.**—*Puerto Rico Jl. of Public Health & Trop. Med.* 1938. Dec. Vol. 14. No. 2. pp. 95–117. [54 refs.] [Spanish version pp. 118–123.]

This paper largely consists of a theoretical consideration of the nature of the causative organism of leprosy and its morphological variations. It should be read in the original by those interested.

L. R.

Rousseau (Paul) & Gaugeat (M.). Culture du bacille de Hansen—a partir du léprome—(suivant la méthode de Vaudremer et Mlle. Brun). [**Cultivation of Hansen's Bacillus.**]—*Rev. Méd. et Hyg. Trop.* 1938. Sept.–Oct. Vol. 30. No. 5. pp. 268–270.

These authors claim to have cultivated Hansen's bacillus by immersing portions of lepromata free from skin in a fluid Aspergillus medium. They describe a cycle of development commencing with a granular cyanophile stage and reaching an acid-fast condition. *L. R.*

Manalang (J.). **Non-Acid-Fast Forms of** *My. leprae* **in Leprotic Lesions : Second Report.**—*Jl. Philippine Islands Med. Assoc.* 1938. Oct. Vol. 18. No. 10. pp. 617–626. With 4 charts.

Four lepromatous patients, with symmetrical lesions on the back, were injected on one side intradermally with *H. wightiana* preparations for from fourteen to seventeen weeks, and the effect on the lepra bacilli noted from time to time. In three there was a definite increase in the proportion of non-acid-fast organisms. In the fourth case abscesses and ulcerations explained the absence of such changes. One patient with repeated mild lepra reactions during the experiment also showed markedly increased non-acid-fasts in the untreated control lesions. The author considers the non-acid-fast forms to be bacilli degenerating as the result of the action of the drugs. *L. R.*

Manalang (J.). **Comparative Effects of Different Chaulmoogra Preparations on** *M. leprae in vitro.*—*Monthly Bull. Bureau of Health.* Manila. 1938. Sept. Vol. 18. No. 9. pp. 451–460.

Experiments to ascertain the effects of the prolonged action of chaulmoogra preparations on acid-fast bacilli in glands removed at autopsies, and kept in test-tubes, are recorded. The numerical diminution or staining alterations of the bacilli were noted each month. The Culion Mercado preparation was most effective in causing the disappearance of the *Myco. leprae* from the glands, and *wightiana* oil and esters in removing acid-fastness. These observations seem to agree with de Vera's clinical trials of similar preparations. *L. R.*

Burnet (Et.). Inoculation positive de la lèpre humaine au hamster ; inoculation négative à divers autres rongeurs. [**Successful Inoculation of Human Leprosy Material in the Hamster ; Failure in Other Rodents.**]—*Arch. Inst. Pasteur de Tunis.* 1938. Dec. Vol. 27. No. 4. pp. 327–340. With 8 coloured figs. on 1 plate.

This paper records the successful infection of a hamster by the insertion under the skin of a small piece of a human leproma. In less than a year a subcutaneous lesion, containing numerous acid-fast bacilli, developed, as shown by coloured illustrations. This confirms Adler's success in 1938 [this *Bulletin*, 1938, Vol. 35, p. 293, and 1939, Vol. 36, p. 240.] The infected hamster did not have its spleen previously removed, and others in which that was done before inoculation proved negative, so that operation is not essential to success. Even if the result is regarded as grafting it still has value. Five similar experiments with hamsters, some of which had their spleens previously

removed, were negative. Further, eight more hamsters, four white rats and one spermophile gave negative results ; for they only showed more or less acid-fast bacilli without any cellular lepromata. *L. R.*

MARCHOUX (E.) & CHORINE (V.). Voies de pénétration des germes de la lèpre dans l'organisme. [**Ways of Penetration of Lepra Bacilli.**]—*Bull. Soc. Path. Exot.* 1938. Nov. 9. Vol. 31. No. 9. pp. 796–803. [12 refs.]

These workers find that the unbroken skin presents a barrier to the penetration of lepra bacilli. The smallest superficial lesions, such as erosions or pulling out hairs by their roots, open the way for penetration of the skin by Stéfansky's bacillus, as well as those of Hansen. The healthy mucous membranes of the eye, digestive tract throughout, and of the genital organs of both sexes, allow of the passage of leprosy infection. The local area and the lymph glands associated with it are first involved. No chancre occurs at the site of infection. The bacilli are spread by the leucocytes. In cases of closed leprosy children born to the infected mother remain free from the disease. The young animals are not more susceptible than adult ones, but individual susceptibility plays an important part. *L. R.*

DES ESSARTS (J. Quérangal). Élimination de bacilles de Hansen au niveau des lésions cutanées fermées de la lèpre. [**Elimination of Hansen's Bacillus in Closed Cutaneous Leprosy.**]—*Bull. Soc. Path. Exot.* 1938. Nov. 9. Vol. 31. No. 9. pp. 806–809.

This paper records microscopical examinations of the skin in closed lesions with a view to determining if Hansen's bacillus can escape through unbroken skin. In the maculo-anaesthetic type the bacilli are few and they were only found in about one-fourth of the cases. A hundred biopsies showed most bacilli in the Malpighian layer. They were also found in the hair follicles and the sweat glands, through which they may be eliminated. There is no reliable test whether bacilli are alive or dead, but those eliminated have all the staining appearances of deep seated organisms. The author therefore concludes that closed cases of leprosy may be a danger to others, although much less so than those with ulcers. *L. R.*

JEREMIAH (R.). "**Infectivity of Neural Leprosy.**"—*Jl. Ceylon Branch Brit. Med. Assoc.* 1939. Jan. Vol. 36. No. 1. pp. 59–60.
BARTHOLOMEUSZ (F. E. R.). **Segregation of Neural Leprosy.**—*Ibid.* pp. 61–62.

These brief notes discuss the infectivity of neural leprosy and the necessity for their segregation. The first author questions if the present Ceylon policy of segregating cutaneous cases and treating neural ones in clinics will prove effective in controlling the spread of leprosy, because neural cases may sometimes become positive to examination for the lepra bacillus.

The second author supports this contention, and considers that patients with active neural disease should be isolated in a special asylum built for neural cases. *L. R.*

PELLAGRA.

Précis of Abstracts in this Section.

The effect of sunlight in producing symptoms of pellagra is discussed by Bickel (p. 543) and Villaret *et al.* (p. 543). These authors report two alcoholic patients who had both suffered from general disabilities, but exposure to the sun brought out the exanthem. Similarly Kielland (p. 544) shows that the initial attack and relapses were connected with exposure to sunlight in a patient in Norway who had been feeling unwell for some time. His diet had been deficient in the PP factor. [See also this *Bulletin*, 1937, Vol. 34, p. 182.]

That there may be an endogenous factor in the aetiology of pellagra is suggested by the occurrence of that disease in uniovular twins reported by Mainzer (p. 544). Although living far apart these twins developed pellagra at the same time, but other members of the family did not.

de Langen *et al.* (p. 545) remark on the possibility of pellagra occurring as a conditional deficiency as a result of various lesions or intoxications. Smoking may have a preventive effect but endocrine disturbances in women probably contribute to conditional deficiency. They think pellagra is not a pure vitamin B_2 deficiency, but is more complex. Similarly Slătineanu *et al.* (p. 545) consider that pellagra develops as a result of unbalanced diet in conjunction with organic insufficiencies. These are interdependent and may depend primarily on intoxication or infection. Claudian and Ghermani (p. 546) have found deficiency of vitamin C in pellagrins and non-pellagrous persons suffering from other diseases. Deficient supply and deficient assimilation probably occur. Maassen (p. 546) reports a case of pellagra due to gastroenterostomy.

Pauly and Deprecq (p. 546) found marked changes in the cells of the anterior horns of the spinal cord in a case of pellagra. There was no subacute combined degeneration nor peripheral neuritis.

Watson (p. 547) considers that the estimation of porphyrin in pellagra by the B.E.S. test is unreliable and not specific and gives values too high when compared with those obtained by a modification of the Fikentscher method. Dobriner *et al.* (p. 547) investigated the excretion of porphyrin in pellagra. The total amount and the amount in the urine fell during treatment. Porphyrinuria is not a constant feature of the disease and may be simply an indication of hepatic dysfunction.

Ionesco and Constantinesco (p. 548) found that the serum carotin in a number of patients with pellagra was low. Creatinin and creatin were also low but increased under treatment by diet, probably due to the excess of meat given. Vilter *et al.* (p. 548) found that the blood of pellagrins was relatively deficient in codehydrogenase, as shown by the inability of *H. influenzae* to grow in high dilutions of blood in peptone water. Under treatment with nicotinic acid the codehydrogenase content was raised to normal. Pellagrins maintained on a pellagra-producing diet and treated with nicotinic acid and vitamin B_1 recover but may relapse. The administration of riboflavine cures these relapses. The authors advise a treatment which ensures adequate mixed vitamins. Slatineanu and Potop (p. 549–50) find the polypeptides in the serum and C.S.F. of pellagrins to be

increased, but not proportionally. Sodium and potassium are decreased irregularly. In general these changes appear to be related to the mental symptoms.

Atrophy of the gastric mucosa with increased secretion and accelerated emptying was found in most of the patients examined radiologically by TYNDEL and TAMLER (p. 550).

Treatment by nicotinic acid and its derivatives is reported on favourably by a number of workers. The dosage required [see pp. 550 to 556] appears to vary considerably and daily amounts, usually in divided doses, of 150 mgm. in slight cases to 1,000 mgm. in severe attacks have been given by the mouth. Doses administered by injection are 100 to 150 mgm. daily. For prevention the requirements also vary considerably. SCHMIDT & SYDENSTRICKER (p. 555) found 100 mgm. twice weekly to be insufficient, SPIES *et al.* (p. 555) found the necessary doses to lie between 50 and 1,000 mgm. daily. SPIES *et al.* (p. 553) give 2 to 5 cc. of coramine *per os* daily to a total of 50 cc., and VILTER *et al.* (p. 554) found some improvement to follow the administration of dinicotinic acid and one of its derivatives. The usefulness of nicotinic acid-amide in skin lesions is shown by KÜHNAU (p. 556).

MANSON-BAHR and RANSFORD (p. 550) draw attention to the importance of the recognition of pre-pellagrous conditions, and SPIES *et al.* (p. 553) describe the nervous symptoms of pellagra which are not always recognized as such.

SYDENSTRICKER *et al.* (p. 551) show how the symptoms clear up under nicotinic acid and have examined its physiological effect in controls. SPIES *et al.* (p. 554) use vitamin B_1 to relieve the pain and numbness of peripheral neuritis in pellagra, and record the reactions of normal persons to the administration of nicotinic acid.

GRECOU *et al.* (p. 552) have not obtained such good results with nicotinic acid as have been reported from America, but the dosage used has been much smaller. ALPORT *et al.* (p. 555) while recognizing the good effects of nicotinic acid in Egypt, have not been able to reproduce the brilliant results obtained in America.

HARRIS (p. 556) describes three experimentally produced conditions in animals which are analogous to human pellagra: canine black tongue, monkey and pig pellagra. Nicotinic acid produces dramatic improvement.

AZMY (p 557) used larostidine and found that the rash in 3 patients disappeared in three weeks. Some anti-pellagra effect was observed after the use of various pyridine compounds by SPIES *et al.* (p. 557), and LEWIS (p. 557) obtained apparently good results with intravenous sodium thiosulphate, 10 cc. of a 10 per cent. solution twice weekly, in one patient. *C. W.*

NAPIER (L. Everard). **Pellagra.**—*Indian Med. Gaz.* 1939. Mar. Vol. 74. No. 3. pp. 137–142. With 5 figs. [10 refs.]

The author's intention is to draw attention to pellagra in India where, he thinks, more cases would be diagnosed if the signs and symptoms were more widely recognized. He gives a long quotation from a Paris journal of 1755 and follows this with a systematic description in which the theories of causation are discussed and the pathology, symptomatology and treatment adequately detailed. *C. W.*

Sen Gupta (P. C.), Rai Chaudhuri (M. N.), Chaudhuri (R. N.) & Napier (L. Everard). **Notes on Cases of Pellagra encountered in Calcutta.**—*Indian Med. Gaz.* 1939. Mar. Vol. 74. No. 3. pp. 143–145.

Notes upon five cases of pellagra coming under care in Calcutta, where at the Tropical Medical School some twelve cases are seen each year. The cases described were typical and call for no comment.

H. S. Stannus.

American Journal of the Medical Sciences. 1938. July. Vol. 196. No. 1. pp. 122–138. [90 refs.]—**Pellagra.**

Bickel (Georges). Alcoolisme chronique et pellagre révélée par une insolation accidentelle. [**Chronic Alcoholism and Pellagra disclosed by the Effects of Sun Bathing.**]—*Schweiz. Med. Woch.* 1938. Oct. 15. Vol. 68. No. 42. pp. 1159–1160. [16 refs.]

Writing from Geneva the author states that he has seen two cases of pellagra in three months and believes that the disease is commoner than is usually recognized. He reports the case of a man who had drunk half a bottle of whisky a day for the past 10 years and seen twenty-four hours after taking a sun-bath. Severe sunburn developed on the arms and legs, hands and feet, there was burning of the tongue and gums, diarrhoea with twenty stools a day, mild delirium, copro-porphyrinuria and general asthenia.

The previous history showed that each spring for five years he had had stomatitis and glossitis, mild dermatitis, irregular bowel action and some change in character. Five doses of 0·1 gm. a day nicotinic acid caused immediate benefit—in four days all symptoms had cleared except the weeping lesions on the hands which took five weeks to heal.

H. S. S.

Villaret (Maurice), Justin-Besançon (L.), Klotz (H. Pierre) & Sikorav. Pellagre chez un alcoolique révélée par un essai d'héliothérapie d'une polynévrite. [**Pellagra in an Alcoholic Subject revealed after Exposure to Sunlight.**]—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1939. Mar. 13. 55th Year. 3rd Ser. No. 8. pp. 367–371.

An account of a 48-year-old male alcoholic in whom the diagnosis of pellagra was revealed by the appearance of a typical skin rash on the lower parts of the legs and dorsa of feet following upon an exposure to the June sunshine of Paris in an attempt on the part of the patient to treat the loss of power in the lower limbs. The symptoms which were antecedent to the exanthem, consisted in a general asthenia, progressive anorexia to complete loss of appetite, associated with vomiting and wasting. The muscles of the legs were markedly affected and walking was almost impossible. Knee jerks were feeble, Achilles jerks absent, with hypo-excitability to the Faradic and Galvanic currents. There were also noted amblyopia with central scotoma for green and pallor of the optic discs.

Treatment consisted in giving vitamin B_1, yeast and liver extract. The skin lesions improved in a few days and on discharge from hospital a month later the patient had gained 5 kilos. in weight. *H. S. S.*

KIELLAND (J.). Et tilfelle av pellagra med opblussing av symptomene efter soling. [**Pellagra and the Effect of Sunlight in producing Symptoms.**]—*Nordisk Med.* 1939. Vol. 1. No. 10. pp. 663–666. English summary.

Eight cases have been recorded in Norway since pellagra was first seen in that country in 1934. The present case is of more than ordinary interest because the initial attack and relapses were distinctly and intimately connected with exposure to sunlight.

A man of 49 years who had been feeling " below par " for some time seized the opportunity of the first brilliantly sunny day of the year, in May 1937, to sun-bathe. Within two days he had attacks of diarrhoea and his hands became very red and he felt greatly depressed. The backs of the hands were red, dry and scaly, the tongue was red. A test-meal revealed achlorhydria. He improved much with dietetic treatment, but twice afterwards the glossitis and dermatitis recurred after exposure to the sun. He was then given a course of dieting rich in the PP factor, and recovered, and on taking such diet was able to subject himself to the sun's rays without showing the above symptoms. His diet prior to his illness had been deficient in the PP factor.

The author quotes SMITH & RAFFIN, who kept 35 pellagrins in bed on a diet poor in PP factor till the symptoms disappeared and then exposed them and a number of controls to small doses of sunshine. None of the controls showed any symptoms, but 20 of the 35 others showed dermatitis and aggravation of their pellagra symptoms.

H. H. S.

MAINZER (Fritz). Ueber Pellagra. I. Mitteilung. Pellagra bei eineiigen Zwillingsschwestern. [**Pellagra in Uniovular Twins.**]—*Acta Med. Scandinavica.* 1939. Vol. 99. No. 2–3. pp. 262–286. With 6 figs. [31 refs.]

That there may be an endogenous as well as an exogenous factor concerned in the aetiology of pellagra is a matter of considerable interest. The question was discussed for the first time by the reviewer [this *Bulletin*, 1937, Vol. 34, p. 183]. In this article by Dr. Mainzer, Director of the Jewish Hospital, Alexandria, the point receives further confirmation by the occurrence of pellagra in uniovular twin sisters aged 23 years. These two young women after living apart from each other, the one in France and the other in Alexandria, for 3 years developed pellagra on four occasions at the same times. A sister and two brothers who partook of the same diet showed no evidence of the affection, the diet itself did not appear to have been qualitatively deficient. All members of the family ate a moderate amount of maize.

The dermal lesions, mental symptoms and blood pictures in both were identical. In both the same degree of diminution of basal metabolism was found. Gastric acidity was only determined in one—achlorhydria was discovered. Other points noted in both were the same marked degree of myopia, identical electrocardiograms, the same low normal values for fasting blood sugar, with the same blood sugar curves after insulin. Serum nitrogen, chloride, uric acid and cholesterol identical values, etc. The blood pressure was higher in one sister than in the other.

H. S. S.

MAINZER (F.). Die Aetiologie der Pellagra. Uebersichtsreferat ueber die Entwicklung und den gegenwärtigen Stand der Frage (1914–1938). [**The Aetiology of Pellagra. A Review of Modern Work and Opinions.**]—*Ztschr. f. Vitaminf.* Berne. 1938/39. Vol. 8. No. 4. pp. 347–365. With 2 figs. [91 refs.]

DE LANGEN (C. D.), BOSWIJK (J. C.) & VAN NIEUWENHUIZEN (C. L. C.). Een endemie van pellagra, genezen met nicotinezuur. [**An Endemic of Pellagra cured with Nicotinic Acid.**]—*Nederl. Tijdschr. v. Geneesk.* 1938. Oct. 8. Vol. 82. No. 41. pp. 4970–4976. With 2 plates. [19 refs.] English summary.

Ten patients were found in a mental asylum suffering from pellagra. Nine of these were treated with nicotinic acid and were completely cured of pellagra ; the tenth was not treated and died. There was no difficulty in the diagnosis as the patients had a typical syndrome. All were females ; four of them were housed in the same pavilion and three in neighbouring pavilions. Six of these patients were " negativistic " and had to be fed. In one ill-nourished patient pellagra developed during treatment with cardiazol injections. Some of these accompanying conditions suggest the possibility of secondary pellagra, a conditional deficiency, such as may be seen in gastric cancer, ulcerative colitis, chronic alcoholism, as a sequel to gastroenterostomy, in syphilis of the stomach and benign stricture of the oesophagus. It is remarkable that all the pellagra sufferers in this institution were women and in view of the instant effect of treatment with nicotinic acid there seems reason to believe that the smoking habits of the men had a preventive effect. It is the opinion of the authors, however, that that is not the whole explanation and that endocrine disturbances in women can be contributory to conditional deficiency. They think it probable also that pellagra may be of complex pathogenesis and, just as beriberi is not a pure B_1 avitaminosis, so is pellagra not a pure B_2 avitaminosis. Dosage in treatment still awaits exact definition. It seems possible to give more than 1 gm. daily. In the present cases 50 mgm. were administered 3 to 4 times daily in milk with little indication of toxic effect. Some patients developed an erythema over the whole body, which usually lasted no more than 15 minutes, but might do so for some hours. *W. F. Harvey.*

SLĂTINEANU (Al.), BALTEANU (I.), SIBI (M.), NITZULESCO (I.) & LEVIT (V.). Contribution à l'étude du chimisme intestinal dans la pellagre. [**Chemical Changes in the Intestine in Pellagra.**]—*Bull. Acad. Méd. Roumanie.* 1938. 3rd Year. Vol. 5. No. 4. pp. 489–503. [38 refs.]

——, ——, NITULESCU (J.) & LEVIT (V.). Contribution à l'étude du chimisme intestinal dans la pellagre.—*Bull. Office Internat. d'Hyg. Publique.* 1938. Oct. Vol. 30. No. 10. pp. 2265–2274. [32 refs.]

The authors' views upon the aetiology of pellagra may be thus translated :—

" Pellagra develops as the result of an unbalanced and one-sided diet reacting upon an organism suffering from organic insufficiencies—gastric, intestinal, hepatic and renal ; these are interdependent and may depend primarily upon an intoxication (alcohol) or an infection (malaria, syphilis, etc.)."

They hold that it is essential to treat the chronic gastritis, the liver insufficiency, the intestinal disorders, etc., as these conditions may not only cause lack of absorption of essential food principles but allow of the absorption of poison and disallow detoxication.

In support of their beliefs they find that pellagrous diets lead to acid production, the faeces are acid with increase in organic acids, the *p*H commonly being about 6; this indicates fermentative bowel flora.

The salicylate reaction points to a loss of detoxication power by the liver. Albumin is lost into the bowel and undergoes putrefaction with the formation of amino-acids and enormously increased ammonia. Histamine-like substances—cadaverine, querdamine, postenine—are present, also sulphur compounds, porphyrin, indol, skatol, phenols, etc., are all increased. Vitamins produce a transitory beneficial effect but vitamin deficiency is not the real cause of pellagra.

H. S. S.

Claudian (I.) & Ghermani (A.). Recherches sur la carence de vitamine C chez les pellagreux, par le test de saturation. [**Vitamin C Deficiency in Pellagrins, gauged by the Saturation Test.**]—*C. R. Soc. Biol.* 1938. Vol. 129. No. 33. pp. 999–1003.

Clinically pellagra often suggests a plurivitaminic deficiency state. Some observers have believed that a vitamin C deficiency occurs in some cases and good results have been noted following the administration of this factor.

Using the saturation test of Harris and Ray and the intravenous method of administration of ascorbic acid, the work being carried out in the winter and early spring, the authors have found a retention of considerable degree not only in pellagrins but also in non-pellagrous inhabitants living under the same conditions in Rumania. Among patients admitted to hospital for other conditions, including cirrhosis of the liver, gastric carcinoma, Graves' disease and pernicious anaemia similar figures were obtained, but in normal healthy well-fed individuals there was no evidence of deficiency of vitamin C. They suggest that states of deficiency may arise both from a deficiency in food supply and from a defect in assimilation. *H. S. S.*

Maassen (Reimer). Sekundäre Pellagra nach Gastro-Enterostomie (B_2-Komplex-Avitaminose). [**Secondary Pellagra after Gastro-Enterostomy.**]—*Deut. Med. Woch.* 1938. Sept. 23. Vol. 64. No. 39. pp. 1398–1399.

Report upon a typical case of pellagra with dermal and psychotic manifestations, etc., associated with achylia, due to gastro-enterostomy and entero-anastomosis for simple pyloric stricture, observed in Görlitz.

Treatment consisted in a diet rich in vitamin B_2 and B_6, injections of liver extract and nicotinic acid. *H. S. S.*

Pauly (R.) & Deprecq (M.). Pellagre et troubles nerveux. [**Pellagra and Changes in the Nervous System.**]—*Jl. Méd. de Bordeaux.* 1939. Feb. 11–18 & 25. Vol. 116. Nos. 6–7 & 8. pp. 145–156; 183–194. With 6 figs. [84 refs.]

The substance of this long article deals with a single case of pellagra, clinical notes, post-mortem findings and histo-pathological examination

with special reference to the nervous system; a second almost identical case is noted but not detailed.

The authors point out how very few cases of pellagra have been published in France since the War and that in consequence ignorance concerning pellagra and especially of the nervous lesions of the disease has come to be widespread. The case described was that of a woman, a chronic alcoholic, aged 34, seen at Bordeaux in 1934 in third relapse. Both patients died. No treatment is mentioned as having been given. The lengthy anatomo-pathological descriptions it would be difficult to summarize here but it is remarked in regard to the C.N.S. that while degeneration of hyalin sheaths was absent, cell changes were marked especially in the anterior horns of the cord. The changes of a subacute combined degeneration were absent and signs of any peripheral neuritis wanting. Some general discussion on the neurological and psychical symptoms in pellagra is followed by a discussion upon anatomo-pathological findings and then a section upon aetiology, in which the authors appear to incline towards a theory which would include vitamin deficiency, toxic agents or virus infection.

H. S. S.

Watson (C. J.). **The Urinary Pigments in Four Cases of Alcoholic Pellagra.**—*Proc. Soc. Experim. Biol. & Med.* 1938. Dec. Vol. 39. No. 3. pp. 514–518. With 1 fig.

Writing from the University of Minnesota the author points out that the method of estimating porphyrin in the urine in pellagra adopted by Beckh, Ellinger and Spies (B.E.S. test) is far from reliable; the results compared with those obtained by a modification of the Fikentscher method (red fluorescence in U.-V. light with the Zeiss stufenphotometer), are far too high. Beckh and his colleagues obtained figures as high as 100 mgm. per litre whereas with the newer test the figures never exceeded 0·6 mgm. per day. The higher figures correspond very much with those obtaining in idiopathic porphyrinuria but red urine has never been described in pellagra. The fact is that the B.E.S. test is not specific for porphyrin. Other pigment bodies, possibly having a common origin with porphyrin, give positive reactions; such bodies might originate by esterification or conjugation. On the other hand it is suggested they might be indigo derivatives—indirubin, indipurpurin.

[The B.E.S. method consists of the extraction of acidified urine with ether, after which the ether is extracted with a small amount of 25 per cent. HCl. Red or red violet colour is considered to be due to porphyrin and is estimated colorimetrically with a standard porphyrin solution. See *Quart. Jl. Med.*, 1937, Vol. 6, p. 305.] *H. S. S.*

Dobriner (Konrad), Strain (W. H.) & Localio (S. A.). **The Excretion of Porphyrin in Pellagra.**—*Proc. Soc. Experim. Biol. & Med.* 1938. June. Vol. 38. No. 5. pp. 748–752. With 1 fig. [11 refs.]

A case of pellagra has been studied in order to determine whether the increased output of porphyrin in the urine is due to a normal total output with an increased proportion excreted by the liver through the urine or not, also whether the porphyria represents a simple increase of a normal process due to increased haematopoiesis or a pathological metabolism of pigments marked by the excretion of coproporphyrin Type III.

The case was a typical alcoholic case with dermatitis, stomatitis, vulvitis and diarrhoea. Free hydrochloric acid was present in the gastric juice. Treatment was by yeast and liver extracts. During a 6-day observation control period the total coproporphyrin excretion averaged 897 mgm. per day ; of this 254 mgm. were excreted in the urine. In the first nine days of therapy, coincidently with clinical improvement, the total excretion fell to a daily average 458 mgm., of which 157 were found in the urine. Large amounts of proto-porphyrin and deuteroporphyrin were also found in the faeces, possibly due to bleeding into the bowel.

The excreted coproporphyrin was a mixture of Types I and III, the first determined by melting point, the second in only small amounts, insufficient for final determination. This mixed porphyrin excretion is similar to that reported in pigment cirrhosis of the liver and lead poisoning and differs from that of pernicious anaemia, haemolytic jaundice, etc., in which only Type I is produced and excreted.

The porphyrinuria in pellagra must be interpreted with care. It is not a constant feature of the disease. It may be simply an indication of hepatic dysfunction. *H. S. S.*

Ionesco (N. Gruia) & Constantinesco (P.). Recherches de laboratoire dans la pellagre. [**Laboratory Research in Pellagra.**]—*Bull. et Mém. Soc. Méd. Hôpit. de Bucarest.* 1938. Nov.–Dec. Vol. 20. No. 9–10. pp. 305–315.

(*a*) Using the method of Halden and Unger with the aid of Pulfrich's photometer, estimations of the serum carotin in 21 pellagrins were made. In 7 cases it was below normal limits (0·02 to 0·11 mgm. per litre) ; in the remainder there was a tendency towards the lower limit. In 18 cases the average figures obtained before and after treatment were 0·0263 mgm. and 0·0338.

In 7 of the 21 cases palmo-plantar xantho-chromia was noted but no corresponding increase in serum carotin was found. It is suggested that either this colouration in cases of pellagra is not due to carotin or that in this disease carotin may become fixed in the tissues with consequent reduction in the blood.

(*b*) In the same series of cases using the technique described by Rappaport and Geiger, fibrinogen was found to be present in normal amounts. Accompanying successful treatment a slight increase was noted.

(*c*) In 28 cases of pellagra determinations of creatinin and creatin were made using the method of Lieb and Zacherl. Totals tended to be in the region of the lower limits of normal (or actually diminished according to French standards) but while the creatinin values are much increased, those for creatin are proportionately diminished.

As the patient improves under treatment by diet the figures tend to become readjusted (probably due to the excess of meat given). *H. S. S.*

Vilter (Richard W.), Vilter (Sue Potter) & Spies (Tom D.). **Relationship between Nicotinic Acid and a Codehydrogenase (Cozymase) in Blood of Pellagrins and Normal Persons.**—*Jl. Amer. Med. Assoc.* 1939. Feb. 4. Vol. 112. No. 5. pp. 420–422. [11 refs.]

Using the knowledge made available by the Lwoffs, namely that bacilli of the influenza group will not grow in culture devoid of what

was called "growth factor V," now identified as codehydrogenase ("cozymase" of VON EULER, "coferment" of WARBURG) and that the organisms cannot synthesize it from its components—nicotinic acid amide, adenylic acid, ribose and phosphoric acid, the authors decided to test the codehydrogenase blood content in pellagrins. The actual method employed will not be detailed here but the results are expressed in blood dilutions which would support growth. With four normal controls dilutions in peptone up to 1 : 12,000 supported growth of *Haem. influenzae*; the blood of three pellagrins in dilutions of only 1 : 2,000.

Maintained on a pellagra-producing diet but treated with nicotinic acid, growth-promoting activity of the blood of the pellagrins was raised to normal.

It is argued that cozymase (coferment) is significantly raised by nicotinic acid therapy, and the hypothesis is suggested that the value of nicotinic acid in pellagra depends on the synthesis of nicotinic acid nucleotide and finally of codehydrogenase in the body.

Supplementary observations showed that in one case of pellagra with mental symptoms the blood contained no growth-promoting factor V at all. After 2 days' treatment with 500 mgm. nicotinic acid the symptoms cleared and growth occurred in a 1 : 4,000 dilution.

In 3 cases of diabetes mellitus with severe acidosis the cozymase content was found to be markedly lowered but return to normal occurred with correct diet or insulin or nicotinic acid.

In 2 cases of lymphatic leukaemia which had been treated by X-rays growth supported only in 1 : 1,000 dilution and no improvement occurred after nicotinic acid therapy. Three cases of malignant disease and one of Hodgkin's disease supported better growth than normal; one case of pernicious anaemia at a dilution of 1 : 8,000. The V factor may also be demonstrated in the urine.

The other part of the paper deals with the probability of another factor being concerned in pellagra.

It has been shown that pellagrins maintained on a pellagra-producing diet with supplements of nicotinic acid and vitamin B_1 lose their symptoms but that some of them relapse. A further study was made: four cases of endemic pellagra from Birmingham, Ala., were maintained on a pellagra-producing diet plus 100–400 mgm. synthetic nicotinic acid and 10 mgm. synthetic vitamin B_1 each day. Within 1 to 2 months the patients began to lose appetite and weight and a mild dermatitis appeared and this clinical picture persisted unchanged for the next 10 months. Fifty mgm. riboflavin on two successive days were then administered. Within 48 hours improvement occurred, with increased vigour and sense of well-being and the skin changes were less marked.

The authors believe that riboflavin is useful in human nutrition and in pellagra in relapse, and that as diseases due to deficiency of water-soluble vitamins are of complex origin, treatment should include the administration of mixed vitamins. *H. S. S.*

i. SLATINEANU (Al.) & POTOP (I.). Recherches sur le taux des polypeptides dans le sang et dans le liquide céphalorachidien chez les pellagreux. [**The Polypeptide Content of the Blood and Cerebrospinal Fluid in Pellagrins.**]—*C. R. Soc. Biol.* 1938. Vol. 129. No. 30. pp. 713–715.

ii. Slatineanu (Al.) & Potop (I.). Le sodium et le potassium du sérum et du liquide céphalorachidien dans la pellagre. [**The Sodium and Potassium Content of the Blood and Cerobrospinal Fluid in Pellagra.**]—*Ibid.* pp. 718–720.

i. Estimations were made among several groups of pellagrins numbering 50 in all. The authors found that the polypeptides in serum and in cerebrospinal fluid are in general augmented in quantity, but great variations occur. The polypeptides in blood and C.S.F. are not proportional. The variations of the polypeptides of the C.S.F. are independent of the variations in non-proteid N. and of albumin in the C.S.F. In the majority of cases the variations in the polypeptides of C.S.F. appeared to be related with changes in mental conditions.

ii. Considerable variations of total sodium and potassium occur in serum and C.S.F. of pellagrins (58 cases). The totals for each do not run parallel in the serum nor in the C.S.F.

Blood potassium tends to be diminished in psychotic cases, in C.S.F. there is great variability. Blood sodium tends also to be diminished and in the C.S.F. variations occur as seen in the blood.

H. S. S.

Tyndel (M.) & Tamler (N.). Röntgenuntersuchungen des Magens bei Pellagra. [**X-ray Examinations of the Stomach in Pellagrins.**]—*Med. Klin.* 1938. Aug. 19. Vol. 34. No. 33 (1756). pp. 1090–1091.

Thirteen cases of pellagra were submitted to careful X-ray examination of the stomach. In eleven a complete atrophy of the folds of the mucous membrane was demonstrated. In all marked increase in gas retention was shown throughout the gastro-intestinal tract and in most signs of increased secretion and accelerated emptying while the great proportion showed pathological alteration in form of the stomach, either elongation or dilation. *H. S. S.*

Manson-Bahr (Philip) & Ransford (O. N.). **Stomatitis of Vitamin-B_2 Deficiency treated with Nicotinic Acid.**—*Lancet.* 1938. Aug. 20. pp. 426–428. [12 refs.]

The authors report an interesting example of the condition which they refer to as the pre-pellagrous state and the result of treatment with nicotinic acid.

A married woman aged 62 gave a history of 5 years' morning diarrhoea, raw sore tongue and soreness at the angles of the mouth. Later tingling sensations and numbness down the outer side of one leg were complained of. Examination revealed little beyond a distended abdomen, exaggerated deep reflexes, a mild microcytic anaemia and a considerable hyperchlorhydria. The patient complained of malaise and depression.

Treatment consisted of an alkaline mixture and 150 mgm. nicotinic acid daily. The diarrhoea ceased immediately, in 48 hours the lips had healed and the tongue was clearing up. At the end of 10 days the patient was practically well.

[This case serves to illustrate the importance of recognizing these conditions of pre-pellagra or sub-pellagra. They may be more frequent in temperate climates than is usually believed. At the same

time the authors' statement " In temperate climates the skin lesions of pellagra do not appear " needs modifying ; cases of this disease with typical dermatitis occur in England as everywhere else.]

H. S. S.

Sydenstricker (V. P.), Schmidt (H. L.), Jr., Fulton (M. C.), New (J. S.) & Geeslin (L. E.). **Treatment of Pellagra with Nicotinic Acid. Observations in Forty-five Cases.**—*Southern Med. Jl.* 1938. Nov. Vol. 31. No. 11. pp. 1155–1163. [17 refs.]

Forty-five cases of pellagra (40 endemic, 2 alcoholic, 3 secondary) were treated in the University Hospital, Augusta, Georgia, with nicotinic acid. The physiological effect of the drug was also essayed in controls, 10 whites and 7 negroes. It was found that 75 to 100 mgm. produced flushing, tingling and tachycardia, and lowering of blood pressure occurred with bigger doses—250 to 1,000 mgm. There was also an increased gastric acidity in most cases comparable with that produced by histamine.

Full case notes are given of the 45 individuals, 30 of whom had suffered previous attack. They were all typical and need not be further detailed here.

The authors appear to consider the most beneficial dosage to be 600 mgm. daily for 3 days followed by a daily maintenance dose of 100 mgm. in four fractions at 4-hourly intervals.

Glossitis, stomatitis and diarrhoea cleared up in 24 hours, the dementia in 3 to 5 days and the dermatitis in a week. With this treatment previously diminished gastric hydrochloric acid increases, or reappears if previously absent, in most cases ; porphyrinuria disappears. *H. S. S.*

Ruffin (Julian M.) & Smith (David T.). **Treatment of Pellagra with Special Reference to the Use of Nicotinic Acid.**—*Southern Med. Jl.* 1939. Jan. Vol. 32. No. 1. pp. 40–47. With 4 figs. [33 refs.]

A short article reporting a small series of cases of pellagra treated with nicotinic acid in dosage corresponding to 1·5 mgm. per kilo. body weight daily parenterally, at Duke University School of Medicine, Durham, N. Carolina. Results were comparable to those obtained by other American observers. *H. S. S.*

Matthews (R. S.). **Pellagra and Nicotinic Acid.**—*Jl. Amer. Med. Assoc.* 1938. Sept. 24. Vol. 111. No. 13. pp. 1148–1153.

Case reports to illustrate the curative value of nicotinic acid in pellagra from Columbia, South Carolina.

The spectacular disappearance of gastro-intestinal and mental symptoms is remarked and the necessity of treating neuritic symptoms with vitamin B_1 is pointed out. The author has used a 1 per cent. solution of nicotinic acid prepared by Merck in doses of 20 to 30 cc. up to a total of 1,000 mgm. daily or in doses of 10 cc. (sterilized) intravenously or intramuscularly up to 100 mgm. *H. S. S.*

Grecou (Aurel), Ionescou (N. Gruia) & Constantinescou (P.). L'acide nicotinique dans le traitement de la pellagre. [**Nicotinic Acid in Pellagra.**]—*Bull. et Mém. Soc. Méd. Hôpit. de Bucarest.* 1938. Nov.–Dec. Vol. 20. No. 9–10. pp. 283–299. [34 refs.]

After referring to the observations of others upon the subject, the authors report in short eighteen cases of pellagra treated at Panceşti and Ploeşti with nicotinic acid. While admitting that this substance is not without some use in the treatment of the disease, their results fall far short of those published in America. It is suggested that the disease as seen in America and as seen in Rumania possesses a rather different clinical picture and that this in turn depends upon some difference in the grouping of deficient factors, so that while in America nicotinic acid yields brilliant results, in Rumania they are less satisfactory.

[Another possible explanation may be that the dosage of the drug was much smaller than that now commonly used in America. The Rumanian observers at the same time do not appear to have appreciated the fact upon which American writers have laid stress, namely, that the amount of nicotinic acid required in individual cases varies very widely.] *H. S. S.*

Rachmilewitz (M.) & Glueck (Helen I.). **Treatment of Pellagra with Nicotinic Acid.**—*Brit. Med. Jl.* 1938. Aug. 13. pp. 346–348. [10 refs.]

British Medical Journal. 1938. Aug. 13. pp. 353–354.—**Nicotinic Acid for Pellagra.**

In this article is given an account of two very typical cases of pellagra treated at the Rothschild Hadassah Hospital, Jerusalem, by nicotinic acid. *All* signs and symptoms (except disordered patellar reflex) cleared up including skin lesion, diarrhoea, mental disturbance, etc. The glossitis which was present in one of the cases was the first condition to improve. [It is, however, noteworthy that in the second case, the much more severe of the two, there was no glossitis. This absence of glossitis may occur in any series of cases as has been pointed out elsewhere. But the cure of the glossitis has been used by a number of observers as the index of an antipellagrous substance, including nicotinic acid. How then is explained the absence of glossitis in cases presumably suffering a nicotinic acid deficiency ? As has been suggested by the reviewer elsewhere a study of the exceptional cases may throw considerable light on the subject ; their explanation is urgently needed.]

In the leading article a short account is given of the history of the introduction of nicotinic acid in the treatment of pellagra. *H. S. S.*

Bernth (O.) & Stürup (G. K.). Nikotinsyrebehandling af pellagra. [**The Treatment of Pellagra with Nicotinic Acid.**]—*Ugeskr. f. Laeger.* 1938. Vol. 100. pp. 1137–1140. [13 refs.]

Ravn (J.). Et tilfaelde af pellagra behandlet med nicotinsyre. [**A Case of Pellagra treated with Nicotinic Acid.**]—*Ibid.* pp. 1140–1141.

The case recorded by Bernth and Stürup was that of a woman, aged 41, with gastric achylia, anaemia, depression, lassitude, anorexia,

glossitis, skin and mucous membrane changes characteristic of pellagra, and violent diarrhoea. The administration of nicotinic acid stopped the diarrhoea at once. The cutaneous manifestations disappeared in a fortnight, and the mental condition improved.

Ravn's patient was a 30-year-old woman suffering from schizophrenia and typical pellagra. The administration of nicotinic acid was followed by rapid improvement, the stomatitis and diarrhoea disappearing first, and the changes in the skin somewhat later.

C. Lillingston.

Spies (Tom Douglas), Aring (Charles Dair), Gelperin (Jules) & Bean (William Bennett). **The Mental Symptoms of Pellagra. Their Relief with Nicotinic Acid.**—*Amer. Jl. Med. Sci.* 1938. Oct. Vol. 196. No. 4. pp. 461–475. [21 refs.]

A paper read at Atlantic City reciting the many nervous symptoms which may be witnessed in pellagra. These symptoms are well known to pellagrologists but in practice not always recognized for what they are. Many are neurasthenic in type—fatigueability, insomnia, anorexia, vertigo, palpitation, headache, nervousness, unrest, apprehension, anxiety, forgetfulness and paraesthesiae.

There may be also loss of memory, disorientation, confabulation and confusion or further excitement, delirium, mania or depression. There may be a trend towards a paranoid reaction with fears of relatives and delusions of persecution. [That such symptoms may occur when the more ordinarily recognized signs of pellagra are mild or wanting should never be lost to mind.]

Sixty acute cases with mental manifestations were submitted to treatment by nicotinic acid or coramine, after a period of observation, without any other supplement to a control diet. Recovery took place in all cases, in from 10 hours to 6 days, and no recurrence occurred if a maintenance dose of nicotinic acid was kept up. If the dosage was stopped relapse occurred in a third of the cases. Nicotinic acid also was shown to prevent the development of mental symptoms in cases of subclinical pellagra. It will be noted that only acute cases were treated. Some 26 other cases—Korsakow's psychosis, manic depressive states, involutional insanity, schizophrenia, etc., received no benefit from similar treatment.

The dosage of nicotinic acid used was 500 to 1,000 mgm. daily by mouth or 5 doses of 20 mgm. daily intravenously; that of coramine, the diethylamide of nicotinic acid, was 2 to 5 cc. daily by mouth to a total of 20 to 50 cc. *H. S. S.*

Bogart (C. N.). **Nicotinic Acid in the Treatment of Pellagra. Report in a Case of Marked Dementia.**—*Jl. Amer. Med. Assoc.* 1938. Aug. 13. Vol. 111. No. 7. pp. 613–614.

A severe case of pellagra of endemic type in sixth relapse with dementia. Recovery was complete after seven days' treatment with 5 daily doses of 100 mgm. nicotinic acid. The case is published to emphasize the effect of the drug in acute pellagrous dementia.

H. S. S.

Spies (Tom Douglas), Bean (William Bennett) & Stone (Robert E.). **The Treatment of Subclinical and Classic Pellagra. Use of Nicotinic Acid, Nicotinic Acid Amide and Sodium Nicotinate, with Special Reference to the Vasodilator Action and the Effect on Mental Symptoms.**—*Jl. Amer. Med. Assoc.* 1938. Aug. 13. Vol. 111. No. 7. pp. 584–590. With 2 figs. [11 refs.]

The authors in treating 73 cases of pellagra in hospital found that within 72 hours of the administration of large doses of nicotinic acid amide [coramine], fading of the mucous membrane lesions and blanching of the cutaneous lesions, when present, regularly occurred; at the same time the functions of the gastro-intestinal tract tended to return to normal, there was remission in mental symptoms and porphyrinuria decreased. The peripheral neuritis was not relieved but pain and numbness disappeared 48 hours after the injection of 50 mgm. vitamin B_1 twice daily. Subsequently 96 relapsing cases of pellagra were treated at their own homes without any change of conditions. Within three days these pellagrins "volunteered they felt much better and that dizziness, depression, burning sensations, confusion and 'upset head' had disappeared." This improvement after several weeks was, however, not maintained, though good effect was observed on increasing the dosage. This experiment is still being carried on.

It was noted that in pellagrins each individual varied very greatly in response to the same dosage and very differently to different dosage. The same was true of normal persons treated with nicotinic acid—the amount which will produce a reaction varies very greatly in different individuals and in the same individual at different times. In pellagrins there is an increased need for nicotinic acid with infection, fever, or exercise. The reactions to nicotinic acid were studied in normal individuals.

The flushing, tingling, increased warmth, etc., are most marked on the ears and over the malar regions and neck, the flush is blotchy over the trunk and less marked over the abdomen and extremities. Circumoral pallor may be noticed. The perineal region and axillae may be affected—increased warmth, sweating and itching. No changes in the tongue or mucous membranes have been noted. Nausea, vomiting and abdominal cramps may occur but there is no constant deviation of pulse-rate, blood-pressure, respiration or electro-cardiogram. The reaction appears to differ from that produced by acetylcholine or histamine. *H. S. S.*

Vilter (Sue Potter), Bean (William Bennett) & Spies (Tom Douglas). **Further Observations on the Effect of 2, 6-Dimethyl Dinicotinic Acid and Dinicotinic Acid on Pellagrins in Relapse and on Normal Persons.**—*Southern Med. Jl.* 1938. Nov. Vol. 31. No. 11. pp. 1163–1164.

Experiments were made concerning the value of 2, 6-dimethylpyridine-3, 5-dicarboxylic acid and 3, 5-pyridine dicarboxylic acid in the treatment of 9 pellagrins, given in doses of 500 to 1,000 mgm. per diem. Some improvement was observed in 5 cases; these substances are of little use in the treatment of pellagra. It was also found that the physiological response as witnessed in the pellagrins and 2 controls differed from that of nicotinic acid in that there were no vasomotor reactions. *H. S. S.*

Spies (Tom D.), Grant (Jean M.), Stone (Robert E.) & McLester (James B.). **Recent Observations on the Treatment of Six Hundred Pellagrins with Special Emphasis on the Use of Nicotinic Acid in Prophylaxis.**—*Southern Med. Jl.* 1938. Dec. Vol. 31. No. 12. pp. 1231–1237. [13 refs.]

Much has already been written upon the treatment of pellagra by nicotinic acid. The present article deals with the evaluation of the pellagra-preventive properties of this substance in persons who having had pellagra with relapse, had remained in their usual surroundings, on their usually grossly inadequate diet and in whom recurrence appeared imminent.

In 173 so selected persons treated with nicotinic acid no relapse occurred, whereas the relapse rate in control groups was between 85 and 100 per cent.

The necessary dosage was found to vary very greatly. Three persons remained free of pellagra symptoms on 50 mgm. daily ; two required 1,000 mgm. daily to keep them free. As the relapse season advanced so the dose had to be increased. The study was carried out in Birmingham and Jefferson City, Alabama, between 15th February and 1st September, 1938.

In a few cases treatment was discontinued for 1–2 weeks with the prompt appearance of symptoms of subclinical pellagra.

A number of cases developed the polyneuritis of pellagra while under treatment which in turn responded to exhibition of vitamin B_1.

H. S. S.

Schmidt (H. L.), Jr. & Sydenstricker (V. P.). **Nicotinic Acid in the Prevention of Pellagra. A Preliminary Note.**—*Jl. Amer. Med. Assoc.* 1938. June 18. Vol. 110. No. 25. pp. 2065–2066.

The authors thought it would be of interest to find out whether nicotinic acid is a potent substance in preventing relapse in pellagra. To this end were selected, from a pellagra outpatient clinic, 33 subjects who had had pellagra, and were showing signs of relapse on 9th March, 1938.

To sixteen, 100 mgm. nicotinic acid were given twice a week ; to the other seventeen, 90 gm. yeast daily were given as controls. The patients remained on their own home diet. Treatment was carried on for the period 16th March to 27th April. The control (yeast) group showed good general improvement though in most cases some glossitis persisted. Among those treated with nicotinic acid, with one exception, though there was a rather dramatic improvement in the first two weeks, retrogression soon set in and their condition at the end of the experiment was as bad as at the beginning. The authors point out that the yeast besides containing specific factors also affords a considerable amount of nutriment. *H. S. S.*

i. Alport (A. Cecil), Ghalioungui (P.) & Hanna (G.). **Treatment of Pellagra with Nicotinamide.**—*Lancet.* 1938. Dec. 24. pp. 1460–1463.

ii. Lancet. 1938. Dec. 24. pp. 1473–1474. [13 refs.]—**Treatment of Pellagra.**

i. Fifteen cases of typical pellagra as it occurs among the Egyptian fellaheen were treated with nicotinamide in ten, with nicotinic acid in

five, while remaining on an ordinary diet. Great improvement was effected in the acute mucous membrane lesions and a slower improvement in the acute skin conditions was noted. Chronic skin lesions in friction areas and chronic atrophic changes in the tongue were only slightly affected. The appetite, mental condition and general physical health of all the patients were improved by the treatment, but gastric acidity never reappeared. Despite the excellent results obtained in the small series of cases the authors say :—

" While we feel satisfied that it is the most effective treatment we have yet tried, we could not confirm the brilliant results obtained after only 24–48 hours by some observers."

ii. In the leading article a résumé of some of the papers on the subject which have appeared in the last two years [all of which have been summarized in this *Bulletin*] is given.

[The writer of the article unfortunately appears to lay stress on the pellagra producing action of maize, which is a pity in view of the fact that maize *per se* is not the cause of pellagra. It is of course true, as is pointed out, that SWAMINATHAN (*Nature*, 1938, Vol. 141, p. 830) has shown that while wheat contains 5·33 mgm. per 100 gm. of nicotinic acid and rice 2·4 to 2·8 mgm., white maize only yields 1·5 mgm.]

H. S. S.

ALPORT (A. Cecil) & GHALIOUNGUI (P.). Ueber die Behandlung der Pellagra in Ägypten mittels Nikotinsäureamid. Ein Bericht von 20 Fällen. [**The Treatment of Pellagra in Egypt with Nicotinamide. A Report of Twenty Cases.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1939. Jan. Vol. 43. No. 1. pp. 34–38. [11 refs.]

ALPORT (A. Cecil), GHALIOUNGUI (P.) & HANNA (G.). **Pellagra and its Treatment with Nicotinic Acid and Nicotinamide with a Review of the Literature.**—*Jl. Egyptian Med. Assoc.* 1938. Dec. Vol. 21. No. 12. pp. 750–761. [15 refs.]

KÜHNAU (Wolfram W.). Pellagraheilung durch Nikotinsäure-Amid. [**Treatment of Pellagra with Nicotinic Acid-amide.**]—*Med. Klin.* 1938. Aug. 19. Vol. 34. No. 33 (1756). pp. 1088–1090. With 4 figs.

An account of two cases of pellagra treated at Bonne with nicotinic acid amide. The skin lesions responded rapidly. That the psychological symptoms would similarly clear up was expected but not realized.

H. S. S.

HARRIS (Leslie Julius). **The Vitamin B_2 Complex. VIII. Further Notes on " Monkey Pellagra " and its Cure with Nicotinic Acid.**—*Biochem. Jl.* 1938. Sept. Vol. 32. No. 9. pp. 1479–1481. With 1 fig. [11 refs.]

Three experimentally produced conditions in animals have been considered as analagous to pellagra in the human being—canine " black tongue," so called " monkey pellagra " and what has been designated " pellagra in pigs."

The present article supplements the author's preliminary paper of last year on " monkey pellagra." Monkeys kept on a basal diet resembling Goldberger's " black tongue " diet containing adequate

amounts of vitamins A, B, C and D develop deficiency symptoms consisting of loss of appetite, diarrhoea, vomiting, loss of weight, a pallor of the skin, some loss of fur, "jumpiness" and more marked emaciation ending fatally—symptoms which are referred to as "monkey pellagra." The exhibition of nicotinic acid produces dramatic improvement within two or three days, in doses daily of 5 mgm. for a monkey weighing 2 kgm. *H. S. S.*

Azmy (Soliman). **The Treatment of Pellagra by Amino Acids. Report of Six Cases from the Post-Graduate Section, Faculty of Medicine, Egyptian University.**—*Jl. Trop. Med. & Hyg.* 1938. Nov. 15. Vol. 41. No. 22. pp. 357–362. With 14 figs.

To three patients with pellagra 1 ampoule of larostidine (Roche) was given intramuscularly daily for 22 days: to 3 other patients histophan 2 ampoules daily for 22 days. It is stated that in all the rash had disappeared by the 21st day of treatment. In one case in which there was also diarrhoea that was also benefited. All or nearly all were suffering from urinary bilharziasis and ankylostomiasis.

It is suggested that in pellagra there is a deficiency of amino-acids and that in the present series cure was effected by the administration of two of them.

[It would obviously be unwise to make any deductions from the results now reported—the series is so small, disappearance of the rash was the only criterion used in evaluating treatment, after results are not mentioned and there were apparently no controls.] *H. S. S.*

Spies (Tom Douglas), Grant (Helen M.) & Huff (Nelwyn E.). **The Antipellagric Effect of Certain Pyridine Compounds.**—*Southern Med. Jl.* 1938. Aug. Vol. 31. No. 8 pp. 901–902. [11 refs.]

An article reporting preliminary trials of some seven pyridine derivatives in pellagra: from the University of Cincinnati and the Hillman Hospital, Birmingham, Alabama.

The following substances were used: Picolinic acid, alpha and beta picoline, trigonelline, beta amino pyridine, 2-6 dimethyl pyridine and di-nicotinic acid. The fifth and seventh substances had previously been isolated from liver extract by others.

The number of cases submitted to trial were very few and the period of trial very short. The authors, however, suggest that a number of pyridine derivatives may have a beneficial effect upon pellagrins in relapse. The 3rd, 6th and 7th mentioned substances appearing to have some antipellagra effect. *H. S. S.*

Lewis (D. R.). **A Case of Pellagra Successfully Treated with Intravenous Injections of Sodium Thiosulphate.**—*Indian Med. Gaz.* 1938. Oct. Vol. 73. No. 10. p. 616.

The patient, a Hindu male, 20 years of age, came under the author's observation presenting typical symptoms of pellagra-rash and discoloration of arms and legs (starting on wrists and ankles two months before), and on the neck, and leukoplakia at the angles of the mouth. His diet was rice and dâl. On admission to hospital the diet was left unchanged and the only treatment was injection twice weekly intravenously with 10 cc. of a 10 per cent. solution of sodium thiosulphate.

Changes were soon observable ; the blackened patches became brown and the brown erythematous and a few days later the pigmentation and erythema disappeared, though the parts first affected—feet, ankles and elbows—remained rough. Appetite improved together with a general sense of well-being and " during treatment " the patient gained 9 lb. in weight. [Nothing is said as to the duration of the treatment.] *H. H. S.*

Castellano (Temistocles) & Garzon (Rafael). Dos observaciones sobre pelagra. Consideraciones diagnósticas, etiopatogénicas y terapéuticas. [**Pellagra. Observations on Diagnosis, Aetiology and Therapeusis.**]—*Prensa Méd. Argentina.* 1939. Jan. 25. Vol. 26. No. 4. pp. 192–219. With 14 figs. [18 refs.]

BERIBERI.

Précis of Abstracts in this Section.

Meyers (p. 558) describes two tests for the diagnosis of beriberi. The first is the development of, or increase in, an audible sound in the cubital fossa after subcutaneous injection of adrenalin. The second and more important is the estimation of diuresis after the fasting patient has drunk 1 litre of water. Both tests should return normal results after the administration of aneurine. He shows (p. 559) that these tests are normal in simple polyneuritis and that the second test may be normal in that form of beriberi which is accompanied by transient oedema. This oedema is due to lowering of the tonus of the walls of the arterioles and increased tension in the capillaries. Aneurine cures both oedema and nervous lesions in beriberi and oedema therefore probably has an intrinsic rather than an extrinsic origin.

Garrett (p. 560) reports a child suffering from polyneuritis and fever who was cured after being given a vitamin B_1 preparation.

Toullec (p. 560) recommends the use in the East of rice so decorticated that it retains vitamin B_1, as in the " parboiled rice " of England and America. A diet for Indo-China containing the necessary 300 I.U. of B_1 is suggested. Kimura (p. 560) also advises the use of rice from which part of the bran is removed but which retains the embryo. This rice is known as Haigamai. *C. W.*

Meyers (F. M.). Clinische onderzoekingen in verband met beri-beri. [**Clinical Tests for Beriberi**].—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1938. June 28. Vol. 78. No. 26. pp. 1537–1550. With 3 figs. [30 refs.] English summary.

The heading of this " first communication " is : " Two criteria for the diagnosis of beriberi." They are dependent on insufficiency of the circulatory apparatus and insufficiency of the water metabolism. The first of these criteria is the development of an audible sound in the cubital fossa with subcutaneous inoculation of adrenalin. If, as is frequent in pronounced beriberi, this phenomenon is already present over the large arteries, with in some cases " pistol-shot "

character, the adrenalin test is superfluous. In any case adrenalin injection should emphasize the phenomenon. The author, however, considers the second criterion, named Volhard's diuresis proof, the more important. This test consists in the fasting patient drinking 1 litre of water and a careful record of the diuresis every half hour for 4 hours. By this time or sooner a healthy person should have excreted all the water. Consideration, of course, must be given to the possibility of loss of water by sweating, especially in the tropics. In both tests it is not sufficient simply to have a positive result. The tests must be completed by observing the restoration to normality with administration of aneurine (vitamin B_1). Many conditions with polyneuritis are, at the present time, regarded as allied to beriberi. It is possible, therefore, that the differential diagnosis between beriberi polyneuritis and polyneuritis of other—infecting, toxic—sorts; the question of the primary "dry" beriberi; the question of the causal connexion, at present popular, between types of neuritis or neuralgia and beriberi; the existence of a "*beriberi sine beriberi*," that is of the existence of the positive vascular test and the positive diuresis test in an individual having no symptoms of beriberi, may be cleared up by the application of the method of testing here presented.

W. F. Harvey.

MEYERS (F. M.). Clinische onderzoekingen in verband met beri-beri. [**Clinical Investigations in Connexion with Beriberi.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1939. Jan. 3. Vol. 79. No. 1. pp. 3–16. [17 refs.] English summary.

"The starting point of the above mentioned research is the opinion that an aneurine-(vitamin B-1)-deficiency appears specifically under two distinct clinical syndromes: first, as a simple polyneuritis and secondly as a complex syndrome with polyneuritis, edema and a disturbance in the function of (the heart and) blood vessels (beriberi). From this point of view, investigations have been undertaken, concerning the significance of the edema in beriberi.

"In most cases of simple polyneuritis, complicating factors precede the nervous lesions; mostly infections. The same is not true for beriberi. Polyneuritis as a rule does not appear to be an early case of beriberi. With a purely anamnestic information, it was not possible to discover any difference in dietary insufficiency between the two groups. Thus the distinction between polyneuritis and beriberi seems to be essential, rather than accidental.

"In about half of the cases of polyneuritis without edema, heart trouble is also absent and in 92 per cent. of the cases of polyneuritis with edema, heart trouble is present (DE LANGEN). Yet it is hardly possible to consider the edema in beriberi as of cardiac origin only.

"The vascular syndrome after an injection of adrenaline that is typical for beriberi (AALSMEER), is absent in the majority of polyneuritis cases and VOLHARD's diuresis test has a normal course in these cases. Meanwhile the last named test may have the same result in beriberi, in which the edema is of a pronounced transient character. These transient edemas represent probably the simplest and purest picture of the beriberi edema. They are of a hydrostatic nature and seem to be caused by a lowering of the tonus of the arteriolar walls and thus by an increased tension in the capillary system.

"Thus the problem of the beriberi edema must be concerted into the question of this circulatory failure. It is unknown, why this failure appears in only a certain group of cases with aneurine deficiency. But, since

treatment with aneurine cures the edema as well as the nervous lesions, it seems probable that the first has an intrinsic, rather than an extrinsic origin."

[See also WENCKEBACH, this *Bulletin*, 1935, Vol. 32. p. 79.]

GARRETT (E. B.). **Polyneuritis with Oedema simulating Beriberi.** [Memoranda.]—*Brit. Med. Jl.* 1938. Aug. 6. p. 287.

The case of a child of 4 years exhibiting polyneuritis with fever. The cause was not ascertained, and the child's diet was a normal mixed diet with no indications of vitamin B_1 deficiency. Improvement followed the parenteral administration of Betaxan (vitamin B_1), otherwise there is no obvious reason for regarding it as a case of beriberi, and the author clearly recognizes this in the title of his record.

H. H. S.

TOULLEC. La prévention du béribéri. [**The Prevention of Beriberi.**]—*Rev. Méd. Française d'Extrême-Orient.* 1938. Feb. Vol. 16. No. 2. pp. 108–119. [Summary appears also in *Bulletin of Hygiene.*]

This is a discussion of the conditions leading to the prevalence of beriberi in the East. The chief factors are the very high proportion of carbohydrates in the diet and the low vitamin B_1 intake. It appears to be impossible to persuade the native to use unpolished rice as he objects to the taste and states that it does not satisfy hunger. The author recommends the use of rice decorticated in such a way that the vitamin B_1 is left in the rice. This is done in what is called in America and England "parboiled rice." The increased production and use of vegetables would help to increase the B_1 supply. The daily requirement of B_1 is believed to be about 300 International Units. 100 I.U. are contained in 200 gm. spinach, white cabbage, carrots, peas, cress, leaks and salads, and in 400 gm. potatoes, in 160 gm. meat, and in 400 gm. of milk. A diet is suggested which would meet the body's needs and, though difficult to attain, would not be actually impossible in Indo-China. *Douglas C. Harrison.*

KIMURA (T.). **The Problem of abolishing the Use of Highly-milled Rice with Reference to the Merit of "Haigamai" (Rice so milled as to retain Embryo-Bud).**—*Jl. Public Health Assoc. Japan.* 1938. Aug. Vol. 14. No. 8. pp. 1–8.

The author strongly advises the wider consumption of "Haigamai," *i.e.*, rice which has been milled so that some of the bran which is digested with difficulty is removed, but in which the embryo which contains large amounts of vitamin B_1 is left. This rice is more easily digestible and more pleasant to the taste than unpolished or half-milled rice. Because of the prevalence of beriberi and latent B_1 avitaminosis, he recommends abolition of consumption of polished rice by legislation, education of rice dealers, urging of authorities responsible for feeding the army and navy, etc., to use Haigamai as a means of increasing the B_1 consumption of the people.

Douglas C. Harrison.

Pallister (R. A.). **Beriberi : a Review of Recent Literature.**—*Jl. Malaya Branch Brit. Med. Assoc.* 1938. June. Vol. 2. No. 1. pp. 39–46. [22 refs.]

Eggleton (William George Elford). **The Zinc Content of Epidermal Structures in Beriberi.**—*Biochem. Jl.* 1939. April. Vol. 33. No. 4. pp. 403–406. With 1 fig. [13 refs.]

VENOMS AND ANTIVENENES.

Précis of Abstracts in this Section.

Snakes.—Johnson (p. 563) describes a method for stripping snakes by the application of an electric current, which causes contraction of the muscles surrounding the glands.

Duran-Reynals (p. 563) shows that spreading factor is markedly present in venom and that the strength of the factor and the toxicity of the venom are closely correlated.

Feldberg and Kellaway (p. 564) record experiments on the action of alcoholic extract of envenomed liver, lysocithin and cobra venom, which cannot be further abstracted. Feldberg, Holden and Kellaway (p. 565) show that the close similarity between the effects of lysocithin and those of venoms is explained if the venom causes the formation of lysocithin in certain tissues. Lysocithin is haemolytic ; its other effects are given in full in the original abstract.

Roy and Chopra (p. 566) compare the properties of cobra and Russell's viper venoms, and Roy (p. 566) has investigated their lipolytic actions. There is a close parallelism between the lecithinase activity and haemolysin formation in the presence of lecithin.

von Klobusitzky and König (p. 566) regard as haptens the coagulating constituents of the venom of *B. jararaca*, after separation from their natural binding substances.

Castellani (p. 567) from experiments with snakes whose poison glands had been extirpated, and whose blood thereafter showed increasing venom content, concludes that venom is a product of tissue metabolism and that one function of the glands is to extract it from the blood.

Fabbri (p. 567) obtained good results from the use of cobra venom as an analgesic in 20 patients with various diseases. Kelly (p. 568) successfully treated patients with herpes simplex by intradermal injections of the venom of *Ancistrodon piscivorus*.

de Azevedo and Teixeira (p. 568) regard the diffuse glomerulonephritis with proliferative endarteritis found in a child who died 26 days after being bitten by *B. jararaca*, as the result of the slow action of the venom, which is excreted by the kidneys.

Kellaway (p. 568) gives the properties of the venoms of the principal Australian snakes, with symptoms of poisoning and methods of treatment. Scortecci (p. 570) records the case of a man in Ethiopia who died 7 hours after being bitten by *Dendraspis angusticeps* in spite of immediate ligature of the limb, scarification, the introduction of potassium permanganate, and, later, suction.

Spiders.—Donohoe (p. 570) shows that an increase in the number of Black Widow spiders found in the raisin vineyards of the San Joaquin Valley has taken place since the introduction of paper trays for the drying of the grapes. The spiders prefer these to the old wooden trays as shelter.

d'Amour *et al.* (p. 571) found that adult *L. mactans* contain about one lethal dose of venom for immature rats. The venom is probably an albumin and produces a potent antiserum in sheep after continued injection of sublethal doses. In the *Journal of the American Medical Association* (p. 571) emphasis is laid on the late effects of poisoning by *L. mactans*. Paraesthesiae and muscular spasms are not infrequent, but may be in part due to autosuggestion.

Scorpions.—Shulov (p. 571) shows that a scorpion can give six effective stings in a short time. There is a difference between the amount of poison of satiated and hungry scorpions. Various factors of age, nutrition, etc., which influence the power of a sting should be considered in evaluating findings.

Waterman (p. 572) records a death rate of 4·7 per cent. in scorpion poisoning, the mortality reaching 25 per cent. in children under 5 years. Death may occur in from 1½ to 42 hours. The symptoms are described and treatment discussed.

Medulla (p. 573) gives a list of scorpions of Cirenaica. The symptoms of poisoning by *Buthus bicolor*, which persisted for more than three months in one patient, are described. Sergent (p. 573) shows that the sting of *Prionurus australis* in North Africa may be fatal to children and old people. The preparation of antivenene is described and its value demonstrated by records of treated patients.

Mody (p. 574) attributes a syndrome of hemiplegia observed in a child to the sting of a scorpion. Barros (p. 574) describes the symptoms caused by the sting of the scorpion *T. serrulatus*. In serious cases serum should be given early in 40 cc. dose for adults and 80 cc. dose for children, repeated if necessary.

Flecker (p. 575) records scorpion sting in five patients in Australia. It appears to be probable that the venom of Australian scorpions is less toxic than that found in other countries, as all these had only slight symptoms.

Tick paralysis.—Barnett (p. 575) describes the symptoms of tick paralysis. The ticks responsible are *D. andersoni* in America and *I. holocyclus* in Australia. Symptoms are those of ataxia and muscular weakness leading to respiratory paralysis, and suggest a lesion of the anterior cornu, but recovery usually takes place rapidly on removing the tick. It is suggested that the tick produces excessive egg venom and excretes it by the over-active salivary glands. Gibbes (p. 576) describes a case and arrives at similar conclusions. Mail (p. 577) shows that over 150 cases have been recorded and that sheep, cattle and horses are attacked. He agrees that *D. andersoni* is chiefly responsible. Robinow and Carroll (p. 577) show that *D. variabilis* is also capable of causing the disease, and describe a case from Georgia, U.S.A.

Ants.—Weber (p. 578) records the intense local reaction he experienced as a result of being stung by the ant *Paraponera clavata* Fabr. Vesiculation occurred with intense pain and temporary paralysis of the limb. It is said that multiple stings may prove fatal to man. *C. W.*

Sabino (Santos Carrasquel). Notas sobre ophidismo. [**Notes on Herpetology.**]—*Brasil-Medico.* 1938. Oct. 22. Vol. 52. No. 43. pp. 962–971. With 5 figs. & 8 photos. [15 refs.]

This is a brief sketch of snakes, pointing out some of the distinctions in the skull and teeth formation between poisonous and non-poisonous snakes, and describing some of the latter and methods of catching them for obtaining venom, together with a few remarks on indications for treatment. *H. H. S.*

Bourret (René). Les serpents venimeux en Indochine. [**Venomous Snakes of Indo-China.**]—*Rev. Méd. Française d'Extrême-Orient.* 1938. May. Vol. 18. No. 5. pp. 465–487. With 12 figs.

This is a brief account of the common venomous snakes of Indo-China. The snakes are described and shown in illustrations and mention is made of the action of the venoms and of the treatments usually adopted. No new work is recorded and the article cannot satisfactorily be abstracted but is a useful guide to the subject.

C. W.

Pasqual (J. R. H.). **Field Guide to the Commoner Colubridae and Viperidae.**—*West African Med. Jl.* 1938. Oct. Vol. 10. No. 1. pp. 36–39.

Johnson (Carl M.). **A New Method for stripping Venomous Snakes.**—*Amer. Jl. Trop. Med.* 1938. July. Vol. 18. No. 4. pp. 385–386.

The usual method of manual manipulation for the evacuation of the venom glands is often accompanied by injury which interferes with subsequent function. Contraction of the muscles surrounding the glands can be obtained by the application of the active electrode of a five to ten volt induced current to the side of the head behind the eye, and of the indifferent electrode to any part of the body. The exact position of the active electrode must be determined by experiment, but in certain snakes a point about midway between the eye and the back of the head at the upper limit of the upper labials is the best. The active electrode is a wooden handle into which is inserted a piece of glass tubing carrying a copper wire which is looped at the end and covered with several thicknesses of gauze. The indifferent electrode consists of coiled wire inserted into a sponge.

The interval between such venom extractions should be not less than two weeks. *C. W.*

Duran-Reynals (F.). **Content in Spreading Factor and Toxins in Organs and Poisonous Secretions of Snakes.**—*Proc. Soc. Experim. Biol. & Med.* 1938. June. Vol. 38. No. 5. pp. 763–766.

The spreading factor, though it exists in practically all mammalian tissues as well as in those from other zoological groups, is most active in cell secretions. Therefore the living cells may only be potential sources of the factor, the activity of which does not become manifest until the secretion itself has undergone some change.

The potency of the spreading factor in venom, blood serum and tissue extracts was determined in four poisonous and two non-poisonous species of snakes. In three of the experiments with poisonous snakes

the venom gland was cut and thoroughly washed before extraction, to remove all traces of the secreted venom. The venoms, sera and tissue extracts were mixed with India ink, a control of saline and India ink was used, and a mixture of the venom, etc., with saline in place of the ink served to show the severity of the lesions uncomplicated by the ink. The table of results shows that the factor is only present in the washed glands in the same proportion as in the other tissues. It is markedly present in the venom, and there is a close correlation between the strength of the factor and the toxicity of the venom. Both the factor and the venom are therefore products rather than components of the gland cells. The serum of snakes shows some activity while that of mammals is practically inactive. [See also CASTELLANI, below.] *C. W.*

FELDBERG (W.) & KELLAWAY (C. H.). **Liberation of Histamine and Formation of Lysocithin-like Substances by Cobra Venom.**— *Jl. Physiology*. 1938. Nov. 14. Vol. 94. No. 2. pp. 187–226. With 30 figs. [22 refs.]

Cobra venom contains a lecithinase which splits off oleic acid from lecithin. The remaining portion, lysocithin, is powerfully haemolytic. Crude lysocithin was prepared by the action of cobra venom on egg lecithin and this, without any attempt to prepare pure lysocithin, was used in the experiments, of which full details are given. The conclusions cannot be better expressed than in the authors' own words :—

" 1. The injection of cobra venom (2–20 mg.) into perfused organs (lung, liver) of dogs and monkeys causes the appearance in the venous perfusate of histamine, of protein and of a substance or substances which cause slow contraction and transient changes in the excitability of the guinea-pig's gut. In the case of the liver, pigments are also set free. No histamine appears in the perfusate of envenomed monkey's liver, since this organ has a very low histamine content. The changes in the venous perfusate from the liver of dogs poisoned by intravenous injections of cobra venom are similar to those observed when the venom is injected into the isolated organ.

" 2. Histamine, protein and liver pigments are *liberated* from the cells of perfused organs, but the substance (or substances) which causes slow contraction of the gut and subsequent changes in its reactivity is *formed* in the organs by the action of the venom.

" 3. This substance is present in large amounts in extracts of envenomed organs ; it is soluble in absolute methyl alcohol and heat stable. Pharmacological actions of alcoholic extract of envenomed monkey's liver (' envenomed liver ') have been compared with those of cobra venom and of extract of lecithin treated with venom (' lysocithin ').

" 4. ' Envenomed liver ' and ' lysocithin ' cause slow delayed contraction of the guinea-pig's jejunum and characteristic after-changes in reactivity to histamine and to acetylcholine. The effects of cobra venom are similar, but in this case the muscle is readily desensitized.

" 5. ' Envenomed liver,' ' lysocithin ' and cobra venom contract the rat's jejunum, the normal guinea-pig's uterus and the uterus poisoned by histamine. In the case of cobra venom the preparations are readily desensitized.

" 6. On the isolated cat's heart ' lysocithin ' causes changes in coronary circulation and strong reduction in the force of the beat ; rapid failure occurs and the heart ceases to beat in diastole or in mid-position. Extracts of normal monkey's liver, which by themselves have no action, protect

from the action of ' lysocithin,' and if the protection is not complete a gradual failure occurs similar to that caused by ' envenomed liver.' Cobra venom (2–4 mg.) causes rapid failure and systolic contracture of the heart.

" 7. Injected into the anterior chamber of the rabbit's eye, ' envenomed liver,' ' lysocithin ' and cobra venom cause opacity of the cornea and irregular alterations of its curvature. Extracts of normal monkey's liver are without effect.

" 8. Injected intravenously into guinea-pigs, ' envenomed liver ' and ' lysocithin ' cause symptoms resembling acute anaphylactic shock with the addition of haemorrhagic oedema of the lungs.

" 9. Washed sheep's red corpuscles are immediately haemolysed by envenomed liver and ' lysocithin ' but not by cobra venom nor by extract of normal monkey's liver. The latter has a protective action against haemolysis by ' lysocithin'.

" 10. ' Envenomed liver ' and ' lysocithin ' injected into the perfused dog's liver cause output of protein, histamine and pigments. With repeated injections the output of histamine increases. These effects are closely similar to those produced by repeated injections of small doses of cobra venom."

C. W.

FELDBERG (W.), HOLDEN (H. F.) & KELLAWAY (C. H.). **The Formation of Lysocithin and of a Muscle-stimulating Substance by Snake Venoms.**—*Jl. Physiology.* 1938. Nov. 14. Vol. 94. No. 2. pp. 232–248. With 11 figs.

In this paper the authors record investigations on the pharmacological activity of purified lysocithin. The previous paper (see above) dealt with the crude substance.

Lysocithin is haemolytic in concentrations up to 1 in 6,400, but has no action on guineapig's gut. It

" causes decreased excitability of the isolated jejunum and contraction of the uterus of the guinea-pig, opacity of the cornea if injected into the anterior chamber of the rabbit's eye and haemorrhagic oedema of the lung when injected intravenously into the intact guinea-pig. It causes the liberation of protein, pigments and histamine from the perfused liver of the dog, and of protein and pigments from the perfused liver of the monkey. In the cat and dog it causes a steep fall of systemic blood pressure which in the former is associated with a rise of pressure in the pulmonary artery and haemorrhagic oedema of the lung and in the latter with a rise of pressure in the portal vein. Injected into the femoral artery of the dog it causes evanescent vasodilatation. These effects resemble those produced by venoms."

Lysocithin and a gut stimulating substance are formed by the action of venom on lymph, egg yolk or lecithin *in vitro* and also in the tissues by the action of venom on perfused organs. The mode of formation of the gut stimulating substance in unknown.

The close similarity between the effects of lysocithin and those of venoms is easily explained if the venom causes the formation of lysocithin which in some instances acts not only alone but also by the liberation of histamine. No desensitization occurs against the action of lysocithin. Desensitization against venom therefore must be accounted for by failure to produce further lysocithin in response to a second dose of venom.

No investigation was made as to whether or not lysocithin plays a part in producing neurotoxic manifestations. *C. W.*

ROY (A. C.) & CHOPRA (R. N.). **Some Biochemical Characteristics of Snake Venom.**—*Indian Jl. Med. Res.* 1938. July. Vol. 26. No. 1. pp. 241–248.

A comparative examination of cobra and Russell's viper venoms showed that the former contains less albumin and more pseudoglobulin than the latter, but has no euglobulin, which is present in the viper venom. Neither shows diastatic action or the capability of inverting saccharose. Both digest fibrin, liquefy gelatine, clot milk and digest casein, but the viper venom appears to be more active than the cobra venom in proteolytic action. Lipolytic action could not be determined on account of the faulty technique employed. Cobra venom is haemolytic in varying degrees for the susceptible species of erythrocytes, but viper venom is non-haemolytic in the large majority of cases.

C. W.

ROY (A. C.). **Lipolytic Activity of the Venoms (Cobra and Russell's Viper).**—*Indian Jl. Med. Res.* 1938. July. Vol. 26. No. 1. pp. 249–257. [11 refs.]

The lipolytic action of cobra and viper venom which was not determined in the work of ROY and CHOPRA above, is reported in this paper. Neither venom has any action on an emulsion of olive oil, but cobra venom acts energetically on ethyl butyrate. The esterase and haemolytic activities, however, are not parallel, since the former is destroyed by heating the venom to 56°C. for half an hour while the latter is not appreciably affected. Both venoms act on lecithin by splitting up fatty acids, but the viper venom appears to have the stronger action. The venom lecithinase is very stable even to boiling for 15 to 20 minutes, but autoclaving entirely destroys it.

There is a close parallelism between the lecithinase activity and haemolysin formation in the presence of lecithin. With an emulsion of cholesteryl oleate, cobra venom showed appreciable lysis of the emulsion, and viper venom a flocculation, but neither could split up the emulsion.

C. W.

VON KLOBUSITZKY (D.) & KÖNIG (P.). Novos estudos immunologicos sobre a substancia coagulante do veneno de *Bothrops jararaca.* [**New Immunological Studies on the Coagulating Substance of the Venom of** *Bothrops jararaca.*]—*Mem. Inst. Butantan.* 1937. Vol. 11. pp. 149–161. English summary.

"Two sera obtained from goats immunized with a solution of *Bothrops jararaca* venom previously purified by means of fractionation and adsorption with $Cr(OH)_3$ showed a certain capacity of fixation although the purified antigen used possessed a higher coagulating power and a lower neurotoxic activity than the original poison :—

"1. They neutralized more completely both the neurotoxic constituents of the natural poison (*Bothrops jararaca*) and the coagulating fraction extracted from it than its original coagulating activity.

"2. They failed to neutralize the original coagulating activity of the rattlesnake poison (*Crotalus terrificus*).

"In the light of these findings it seems that the coagulating constituents of those snake poisons, after separation from their natural binding substances, should be considered as haptens."

Castellani (Giovanni Tarabini). II. Nota sullo studio dei rapporti fra la tossicità del sangue in toto di "*Vipera aspis*" e quella della secrezione ghiandolare del veleno. [**The Resemblance between the Toxicity of Whole Blood and Poison Gland Secretion in *Vipera aspis*.**]—*Arch. Ital. Sci. Med. Colon. e Parassit.* 1938. Apr. Vol. 19. No. 4. pp. 223–228.

The author quotes the findings of Phisalix and Bertrand, who considered that the venom of *Vipera aspis* is formed by some kind of internal secretory mechanism, and who found that the toxicity of the whole blood after extirpation of the poison glands was diminished for a period of one to two months, after which it slowly returned to normal. With this finding the author's present work does not agree.

Using for his experiments specimens of *V. aspis* which were (unavoidably) in bad condition he extirpated the poison glands of a number, of which 8 lived long enough to be of use (10 to 18 days). Eight others with glands left intact were used as controls. Whole blood was withdrawn from all these, and dilutions with 0·9 per cent. NaCl were made as follows:—

	I.	II.	III.	IV.	V.	VI.
0·9 per cent. NaCl	0	0·167	0·278	0·348	0·393	0·433
Whole blood ...	0·5	0·333	0·222	0·152	0·107	0·067

Mice of 18 gm. weight were inoculated intraperitoneally with 0·5 cc. of these dilutions. All the mice inoculated with I and II, from both gland-extirpated and control snakes, died within 16 hours, but whereas all mice in the extirpated group inoculated with III died, only 2 of the controls died (within 25 hours). Signs of intoxication were found with IV and V and in the extirpated group in 13 cases, but only in 8 cases in the control group. The remaining mice were unharmed.

It was also seen that the blood of snakes whose glands had been extirpated 18 days before the experiment was more toxic than that of the 12 day snake. A longer period than 18 days was impossible on account of the bad condition of the snakes.

The author therefore concludes that after extirpation of the glands an increase in the toxicity of the blood is evident on the 12th day and more evident still on the 18th day. He concludes that venom is a product of tissue metabolism and that one function of the poison glands is to extract it from the blood. He does not claim this experiment to be a final proof, but thinks the results might be even more striking in a warm climate using snakes which are in good condition. *C. W.*

Fabbri (Giuseppe). Azione terapeutica del veleno di cobra. [**Therapeutic Uses of Cobra Venom.**]—*Policlinico.* Sez. Med. 1938. May 1. Vol. 45. No. 5. pp. 256–268.

Snake venom has been employed for haemophilia, for haemorrhage after dental extraction and for epistaxis, and also for neuralgias and other painful conditions such as cancer, tabetic crises, leprosy, rheumatism, and for epilepsy. Good reports have been issued under each of these headings, but the venom used has generally been that of Daboia (*Vipera russellii*).

The author of this article has employed cobra venom [he does not mention the species], a colubrine, and gives brief details of twenty patients: six of nerve-root affection, five of carcinoma (three of stomach and one each of uterus and rectum), two of sciatica, two of trigeminal neuralgia, and one each of five other conditions, four neuralgias and one tabes. He started by injecting 1/25 mgm. and after three or four doses in the course of 10–14 days, increased to 1/10 mgm. In nearly every case much relief was obtained from 7–8 injections and in some even earlier. There were no indications of the toxin being cumulative and in the author's hands it proved a very serviceable analgesic. [The method of employment, the site of injection, etc., are not stated.] *H. H. S.*

KELLY (Richard J.). **Treatment of Herpes Simplex with Moccasin Venom.**—*Arch. Dermat. & Syph.* 1938. Oct. Vol. 38. No. 4. pp. 599–602.

Fifteen patients with herpes simplex were treated, when possible in the incipient stage, with moccasin [*Ancistrodon piscivorus*] venom by intradermal doses of 0·2 cc. of a 1 in 3,000 dilution. In some cases one injection was enough, but one patient was given two injections on successive days. The symptoms were usually relieved and the course of the eruption materially shortened and the number of recurrences appears to have been decreased. Three patients with herpes zoster reported relief of symptoms following this treatment but the course of the disease appeared to be unaltered.

Attempts to influence the virus directly by the use of moccasin venom 1 in 3,000 dilution in experiments on rabbits were unsuccessful. [See also this *Bulletin*, 1936, Vol. 33, p. 394.] *C. W.*

DE AZEVEDO (A. Penna) & TEIXEIRA (J. de Castro). Intoxicação por veneno de cobra. Necrose symetrica da cortex renal. Uremia. [**Poisoning by Cobra Venom. Symmetrical Necrosis of the Renal Cortex.**]—*Mem. Inst. Oswaldo Cruz.* 1938. Vol. 33. No. 1. pp. 23–37. With 8 plates. [10 refs.] English summary.

A child of 15 was bitten by *Bothrops jararaca* on the leg and died 26 days later. The principal pathological changes were found in the kidneys and consisted of diffuse glomerulo-nephritis and symmetrical cortical necrosis. Proliferative endarteritis was present and probably accounted for the necrosis. The endarteritis was progressive but was not accompanied by thrombosis.

The authors consider that the renal changes were the result of the slow and prolonged action of the venom, which is eliminated by the kidneys. The blood showed haemoglobin down to 11 per cent. and red cells to 960,000. Renal insufficiency was shown by increase in the blood nitrogen, creatinin, inorganic phosphorus and indican, but the patient did not present the clinical evidence of azotaemic nephritis.

C. W.

KELLAWAY (C. H.). **The Symptomatology and Treatment of the Bites of Australian Snakes.**—*Med. Jl. Australia.* 1938. Oct. 8. 25th Year. Vol. 2. No. 15. pp. 585–589.

From the descriptions given by the author the pharmacological properties of the venoms of Australian snakes may be shown, in general terms, as a table [constructed from the text by the reviewer]:—

	Neurotoxic	Haemolytic and cytolitic	Coagulant
Notechis scutatus (Tiger snake) ...	+++	+	+++
Acanthophis antarcticus (Death adder)	+++	+	0
Denisonia superba (Copperhead)	+++	+++	0
Demansia textilis (Common brown snake)	+++		+++
Pseudechis porphyriacus ...	+	+++	+++
Oxyuranus scutellatus	+++	+	++
Snakes of genus Hoplocephalus ...	+++	+	

Neurotoxic action is a paralysis of both sensory and motor nerve endings but there is also a possible central action. The haemolytic and cytolytic action results in the liberation of histamine and causes symptoms of cardio-vascular failure. The coagulant action causes intravascular clotting and if in large doses may do so in the inferior vena cava and the portal and mesenteric veins with death in a few minutes.

The symptoms of onset may occur in 15 minutes to 2 hours, and are usually nausea, vomiting, faintness and drowsiness. Symptoms of neurotoxic origin are incoordination, blunted sensation, paresis of various muscles including the tongue and diaphragm, and coma. General features may include albuminuria and haemorrhages, the latter due to coagulant venom.

Symptoms may appear relatively slowly, so that death usually takes place at about 48 hours after the bite, but if the venom is injected into a vein, or if a large amount is injected, death may occur in a few minutes. A feature of bites by brown snakes is that sometimes there is a long period of freedom from symptoms after the first 24 hours with death from respiratory failure 36 or 48 hours or more after the bite.

Treatment, if a limb is bitten, consists of immediate ligature, proximal to the bite, to stop arterial flow, of that portion of the limb which contains only one bone. The bite should be washed immediately, with saliva or urine if necessary. Excision or cutting should be performed but are only valuable in the first few minutes. The flow of blood can be assisted by suction and should be encouraged by occasional release of the arterial ligature after a venous ligature has been applied in addition to prevent entry of venom into the general circulation. Local venesection may be performed, using the two ligatures, but is only valuable if an efficient arterial ligature was applied at once.

Monovalent tiger snake antivenene is useful but has no action in brown snake or death adder bites. The dose is 60–100 cc. intravenously. It is wise to perform an intradermal test with 0·1 cc. and if there is any reaction desensitization should be performed as follows: 0·025 cc. subcutaneously, one hour later 0·1 cc. subcutaneously, one hour later 1·0 cc. subcutaneously, one hour later 0·1 cc. intravenously. If the last does not cause allergic symptoms the full dose, diluted to 1 in 5, should be given slowly at body temperature into a vein. Treatment of allergic symptoms is by immediate cessation of the serum injection and the administration of atropine or adrenalin.

The patient should be kept at rest and given black coffee or possibly strychnine. *C. W.*

SCORTECCI (Giuseppe). I "Mamba" dell'Africa Orientale Italiana. [**The "Mamba" in Italian East Africa.**]—*Riv. di Biol. Colon.* Rome. 1938. Apr. Vol. 1. No. 2. pp. 81–90. With 2 figs. English summary (6 lines).

The author gives a brief account of the "mamba", *Dendraspis*, a deadly snake met with in Ethiopia [and elsewhere in Africa]. There are two species at least, the green and the black, but both are here called *Dendraspis angusticeps*. An instance is detailed which illustrates the potency of its venom. One of a hunting party, a man of 21 years, of fine physique and unusually robust, was bitten on the foot by a mamba at 3 p.m. Assisted by one of his companions ligatures were applied immediately, one above and one below the site of the bite [the actual location of the wound is not stated, hence we do not know how a ligature was applied *below* a wound of the foot], the wound was scarified and crystals of potassium permanganate introduced. A little later another ligature was applied above the knee and a fourth to the thigh. On arrival at camp, the man was put to bed, suction applied to the wound and stimulants given. For a time his condition appeared to be satisfactory; then diarrhoea set in with spasmodic contractions of the muscles of the throat; by 9 p.m. he was unable to speak and at 10 p.m. died from respiratory paralysis, "the poison reaching the respiratory centre." In spite of prompt application of tourniquets and local treatment, a healthy robust adult was killed in 7 hours. A plea is made for inclusion of antivenene for *Dendraspis* in the sera for Naia, Bitis, Echis and other local snakes. *H. H. S.*

PHISALIX. L'immunité naturelle des espèces venimeuses et ses mécanismes. [**Natural Immunity of Venomous Species and its Mechanism.**]—*Bull. Acad. Méd.* 1938. May 3. 102nd Year. 3rd Ser. Vol. 119. No. 17. pp. 464–474.

DONOHOE (Heber C.). **Notes on the Black Widow Spider in the San Joaquin Valley.** [Research Notes.]—*Jl. Parasitology.* 1937. Aug. Vol. 23. No. 4. p. 424.

This is an interesting explanation of the recent increase, apparent certainly and actual probably, of *Latrodectus mactans* in the San Joaquin Valley, California, especially in and about farm buildings in raisin vineyards. The grapes used to be dried on wooden trays, stacked in piles, but of late these have been replaced by folded paper trays left on the ground. These are a favoured shelter for the Black Widow spider which thrives on the larvae of the raisin moth, *Ephestia figulilella*, which enters the trays in numbers for egg-laying, and the trays of folded paper offer better concealment for the spider than do the wooden trays. In 1936 no spiders were found in 200 wooden trays in two places, but 29 in 1,100 paper trays from ten different crops; some 36 million papers were used altogether so that it is estimated that there were about 936,000 of these spiders, and in many trays webs were found but no spiders, these having probably escaped during the handling of the trays. Further, raisins from wooden trays are boxed in the vineyards, whereas a large proportion of the paper

trays are hauled to the farmyards for boxing and the spiders enter outbuildings, wood piles and other shelters and so are found in increasing numbers in and about the farm buildings. *H. H. S.*

D'Amour (Fred E.), Becker (Frances E.) & van Riper (Walker). **The Black Widow Spider.**—*Quart. Rev. Biol.* 1937. Vol. 11. No. 2. pp. 123–160. With 5 figs. [Summarized in *Biol. Abstracts.* 1937. Aug–Oct. Vol. 11. No. 7. p. 1872.]

"Numerous observations on the natural history of the black widow spider (*Latrodectus mactans*), including distribution, habitat, temperament, reproduction, development, and means of dispersal. Plates show the sex differences and several stages in the development of the ♀. The second part of the paper is devoted to a study of the venom, its toxicity and chemistry, and of the development of immunity toward it. Similar studies were made of the toxic substance of the eggs. Finally, assays of the hyper-immune sheep serum produced by the E. R. Squibb and Sons Company are recorded. The more important experimental results are summarized: The average lethal dose for immature rats is ·032 mg. of dried venom which is about ¼ the amount present in an adult ♀ spider. Chemical evidence indicates that the venom is a protein, probably an albumen. Injection of sub-lethal doses over a period of time into rats or sheep gives a potent anti-serum, about 25 A.L.D. of venom being neutralized per c.c. None of the antidotes studied was effective. No pathologic abnormalities in rats kept chronically intoxicated could be discovered. About 6,500 spiders and 500 rats were used in this investigation."

Journal of the American Medical Association. 1937. July 31. Vol. 109. No. 5. p. 381.—**Black Widow Spider Bite.** [Queries & Minor Notes.]

The symptoms of poisoning from the bite of the Black Widow spider, *Latrodectus mactans*, may be very severe [see this *Bulletin*, 1936, Vol. 33, pp. 401–403]. The question of late effects, however, has not often come under discussion. The author of this note mentions the case of a man of 35 years who was bitten and presented the usual symptoms, but was not recovered sufficiently to cease treatment by his physician for four weeks. Although six months had elapsed since the bite was inflicted, the patient still complains of cramps in the arms and abdominal muscles and of a degree of weakness which prevents him working. Paraesthesiae, numbness, tingling and transient muscle spasms are not infrequent sequelae of spider-bite, but recovery is usually complete and the severity of these after effects appears to depend not a little upon the autosuggestibility of the subject.

H. H. S.

Shulov (A.). **On the Poison of Scorpions in Palestine.**—*Harefuah.* 1938. July–Aug. Vol. 15. No. 1–2. [In Hebrew. English summary pp. 1–2.]

Experiments with scorpions and with extracts of their stings led to the following conclusions:—

"1. Of the five species experimented with, Buthus 5-striatus is the most poisonous. The degree of venom of the other species falls gradually in the following order: Prionurus bicolor, Nebo, Buthus judaicus, Scorpio maurus.

" 2. Of the five ages of Buthus 5-striatus which were experimented with, the three older ones are the most poisonous. The degree of venom of the two younger ages, up to the length of about 2·5 cm. reaches, according to its influence, half of that of the older ones. The analysis of the contents of the gland showed that the amount of venom of the youngest ages is 1/3 of that of the older ones.

" 3. Comparative experiments made as to the variability of the influence of the venom during the various hours of the day, in different temperatures and seasons showed that there are no differences in the degree of influence in a temperature of 10°C. and above, neither in the different hours of the day nor in the various seasons. It was established that under the conditions of this country there is no interruption of activity in the winter and the multiplication of the scorpions is not connected with any season in particular.

" 4. The estimation of the effective amount of poison excreted from the gland at the same time of the day and season showed that the scorpion, be it even the youngest, can give 6 effective stings, following which the poison becomes weaker, probably due to reduction taking place in the concentration of the excreted poison. There is quite a difference in the amount of poison, both in the gland and as estimated from the bites, of satiated and hungry scorpions.

" 5. The factors effecting a change in the degree of venom depending on the scorpion are very numerous and the following were established with certainty : the species of the scorpion, its age, its state of nutrition, the number of stings it has stung a short time preceding the experiment, the state of the tip of the sting.

" The conditions depending on the animal experimented with are the toughness of the skin at the spot it was stung, whether the body is hairy or not, the proximity of blood vessels to the bitten spot, the general health conditions (perhaps also a special constitution).

" All the above named factors are bound to make the influence of the sting very manifold and also give rise to contradictory opinions originating from unlike individual experiments."

WATERMAN (James A.). **Some Notes on Scorpion Poisoning in Trinidad.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1938. Apr. 20. Vol. 31. No. 6. pp. 607–624. [14 refs.]

The incidence of poisoning by scorpions in Trinidad is uncertain because only severe cases come under medical observation. Most occur between Couva and Siparia in the cane-fields of the south or the cocoa plantations of the north-east ; they often lurk in shoes and clothing. In the five years, 1929–33, there were at one hospital in a cane-growing district 698 cases admitted, 189 in the last year, and 33 deaths, or 4·7 per cent., 13 of them in the last year. The fatality rate, as one would expect, is greatest in the very young ; of 16 under one year six died, and up to the age of 5 years (88 cases, 22 deaths) the rate was 25 per cent., between 6 and 10 years (96 cases, 5 deaths), 5·2 per cent., in the second decade 5 fatal among 190 cases or 2·6 per cent. ; of 324 over 21 years of age only one died. Death might take place at any interval from 1½ to 42 hours.

The symptoms are burning pain, usually lessening in 15 minutes ; the patient feels sick and presents salivation, nausea and vomiting with profuse sweating. The vomit may be dark coffee-ground in colour. Respirations may be as rapid as the pulse, but though there is dyspnoea, there is never cyanosis. Reflexes are increased ; in infants and children convulsions are common and in such cases the prognosis is bad. In half the cases there is glycosuria.

Excretion may occur in poisonous amount in the milk, and the author refers to the case of a woman being stung shortly before nursing her child. The latter showed symptoms of scorpion poisoning and died. A similar condition has been recorded after snake-bite.

At autopsy all the viscera are congested, the lungs are oedematous (due probably to cardiac failure) and small subserous and submucous haemorrhages are visible. The pancreas may show haemorrhages and pancreatic cyst has been found at intervals of varied length afterwards.

Treatment used to be by potassium permanganate intravenously, but this has been given up. Some now give 2 cc. of 0·25 per cent. colloidal manganese intramuscularly, repeated if necessary, and have reported good effects. Others give glucose 10 per cent. rectally, or 3 per cent. subcutaneously followed by insulin. Treatment otherwise is symptomatic. Brief details of eight cases are recorded.

H. H. S.

MEDULLA (Candido). Sugli avvelenamenti da puntura di scorpione in Cirenaica. [**Scorpion Poisoning in Cirenaica.**]—*Arch. Ital. Sci. Med. Colon. e Parassit.* 1937. Aug. Vol. 18. No. 8. pp. 486–493. With 2 figs.

The chief value of this article is the list of scorpions found in Cirenaica. Introductory to this is an account of a soldier aged 48—from the clinical history an "old soldier"—who was stung on the back of the right hand and the arm. He first felt a slight prick on the hand and soon after a more severe one on the arm, and taking off his coat he found in the sleeve two scorpions, a dark-coloured one 4 cm. in length and a light grey one 3 cm.; both proved to be *Buthus bicolor*. He suffered from pain and inflammation in the arm and the larger joints and had fever between 38·5 and 39°C.; he remained in bed for "about a month." The inflammatory signs disappeared with the fall of temperature to normal, but the pains in the muscles and joints persisted and after 96 days more or less confined to bed he was transferred to another hospital where, after a few days of atophan by mouth, with daily massage, the pains disappeared.

The scorpions listed by ZAVATTARI as found in Cirenaica and Tripolitania are 17 in number, *viz.*:—

BUTHIDAE: *B. occitanus tunetanus, B. bargeus, B. quinquestriatus, B. acutecarinatus klaptoczi, B. australis australis, B. a. amoreuxi, B. a. lybicus, B. a. priamus, B. bicolor bicolor, B. b. aeneas, B. b. longecarinatus, B. syrticus*, and *B. leptochelys*.

SCORPIONIDAE: *S. maurus tunetanus, S. m. palmatus*.

CHACTIDAE: *Euscorpius carpathicus*; and *Orthochirus innesi*.

H. H. S.

SERGENT (Etienne). Sérum antiscorpionique. (Note préliminaire.) [**Scorpion Antivenene.**]—*Bull. Acad. Méd.* 1938. Mar. 1. 102nd Year. 3rd Ser. Vol. 119. No. 9. pp. 254–257.

Prionurus australis is the dangerous species of scorpion in Northern Africa, and during the hot season its sting has proved fatal to children and the aged. The symptoms produced are severe pain, at first localized, later extending, vomiting, vertigo, sweating, dyspnoea, cardiac disturbance, coma and death, when it occurs, in 2–24 hours.

The antivenene is prepared by injecting the poison from 100 mixed glands, as the toxin content varies in different scorpions. The fatal dose for a mouse of 20 gm. is 1/40 of a gland, or half a drop of an emulsion of 100 glands in 100 cc. physiological saline. For injection of horses cholesterin, 12·5 gm. per 100 cc., is added and just before injection $HgCl_2$ 1 in 1,000, 1 cc. for each 10 cc. of the emulsion. The initial dose is 1 cc. increasing at first weekly, later fortnightly to 30 glands (a maximum of 60 has been attained). To the final antivenene 1 cc. commercial formalin is added to 3 litres serum ; ampoules are heated to 55°C. for 45 minutes.

A " good " antivenene will protect 75 per cent. of mice injected with a lethal dose and then elsewhere with 10 drops of the serum. *P. australis* antivenene protects also against *Buthus occitanus* and *Pr. Liouvillei* (the black scorpion), both North African scorpions.

The antivenene was used in 33 patients (19 children, 1 old man and 13 adults) seriously ill and thought to be dying ; 26 recovered and 7 died (6 children and 1 adult). In the case of 8 others (7 children, 1 old man) seriously ill, but in whom a fatal issue might be expected from the species of scorpion and the age of the patient, all recovered ; that is, out of 41 cases 34 ended in recovery, 82·9 per cent. Sixty-six who showed symptoms—pain, vomiting, sweats and chills—but not dangerous, all recovered. *H. H. S.*

Mody (S. H.). **Aphasia and Complete Right Hemiplegia after Scorpion Bite.**—*Indian Med. Gaz.* 1938. May. Vol. 73. No. 5. p. 285.

The author records a case of aphasia with supranuclear right facial paralysis and right hemiplegia in a boy aged 11 at Poona. The condition originated five days after the patient had been struck by a scorpion, and no other lesion could be found which would account for it. The author therefore attributes the paralysis to the action of the venom, perhaps through the formation of an embolus of agglutinated red blood corpuscles. *C. W.*

Barros (Evandro F.). O quadro clinico da intoxicação escorpionica. [**Symptoms of Scorpion Sting.**]—*Hospital.* Rio de Janeiro. 1938. Aug. & Sept. Vol. 14. Nos. 2 & 3. pp. 317–330 ; 581–593. [24 refs.]

The species of scorpion dealt with in this long article is *T. serrulatus*. The author divides cases into mild and severe. The former present symptoms of local pain and numbness, hyperaemia and oedema and systemic disturbance with sweating, agitation, headache, vertigo and tachycardia. In severe cases these are all present but aggravated, with vomiting and passage of urine and faeces, and disordered respiration. Each of these symptoms is described fully and discussed in detail as to its pathogeny in the present article. The systemic and distally produced symptoms come on in severe cases within two hours. Mild cases do not need serum, but in the more serious, if the toxic symptoms are marked and two hours or more have elapsed, at least 40 cc. of antivenene should be injected intravenously and this should be repeated if there is no definite improvement in another hour. After a further hour if the amelioration is not marked, 20–30 cc. should be given intramuscularly or intravenously and so on from hour to hour. If the patient is a child under ten years of age, the initial doses are *doubled*, 80 cc. intravenously for the first and, if needed,

the second, and subsequently 20–30 cc. Even after there is apparent recovery, the patient should be kept under observation for at least twelve hours, in case there should be any relapse or return of symptoms. Though the symptoms may be so serious as to "threaten the life of the patient," the fatality rate, if the poison is ever fatal to man, is not stated. The antivenene referred to is that prepared at the Ezequiel Dias Biological Institute, the potency being such that each cc. contains 4–6 m.l.d. for the camondongo (Brazilian house-rat).

H. H. S.

DE MAGALHÃES (Otavio). Escorpionismo. [**Scorpion Poisoning.**]—*Hospital.* Rio de Janeiro. 1938. Mar. Vol. 13. No. 3. pp. 421–426. With 2 figs.

FLECKER (H.). **Injuries caused by Australian Scorpions.**—*Med. Jl. Australia.* 1937. June 5. 24th Year. Vol. 1. No. 23. pp. 875–876.

Three genera of scorpions occur in Australia, namely *Urodacus* of a size up to 120 mm., *Buthidae*, and *Bothriuridae* under 45 mm., *Lychas marmoreus* and *Isometrus maculatus* are species of the last. Practitioners in Tropical Queensland have been asked to report all cases of injury by scorpions, trivial as well as severe, to the Registrar, Cairns.

Five cases are reported in this paper: (1) A child of 5 years, stung on the sole of her foot by *Urodacus spinatus*, suffered from a "sharp stinging feeling lasting for two hours"; the parents were more upset than the child. Reference is made to a case reported in 1924 of a sting by *U. novae-hollandiae* producing a "very bad swollen finger." (2) A man of 38 years stung on the foot by *Lychas marmoreus*; the result was swelling and induration for 12 hours, with a feeling of nausea and a pulse rate of 100 per minute, but no other indications of systemic disturbance. Three cases of sting by *Isometrus maculatus*: (3) man of 28 years stung on the foot. There was severe pain lasting about a minute followed by a burning sensation not very severe for at least another half hour, and a swelling 15 mm. in diameter. (4) A man of 25 years stung on the calf; pain severe for 15 minutes over the whole calf, but passing off in two hours. (5) A woman of 49 years stung on the right index finger; pain spread to the shoulder and lasted for at least three hours. In none of these last three patients were there any constitutional symptoms. Unless only a small amount of venom happened to be injected, and that is hardly likely in all these cases, the toxicity of scorpion venom in these Australian species would appear to be less than in other countries, *e.g.*, in Brazil where the sting of *Tityus serrulatus* may be fatal [see this *Bulletin*, 1936, Vol. 33, p. 399 and J. A. WATERMAN, above]. *H. H. S.*

BARNETT (E. J.). **Wood Tick Paralysis in Children.**—*Jl. Amer. Med. Assoc.* 1937. Sept. 11. Vol. 109. No. 11. pp. 846–848.

Wood tick paralysis in children, though acute, is usually afebrile. The child awakens in the morning feeling quite well, but collapses on attempting to stand, the gait is ataxic when efforts at walking are made, and in a few hours walking and even standing are impossible owing to progressive muscular weakness of the legs, and self-feeding

owing to ataxia of the arms. The offending tick has usually been feeding for 5 or 6 days and is found engorged on any part of the body. If not found and removed death may occur from respiratory paralysis ; if removed recovery is rapid and usually complete in 48 hours. The condition has been reported from Montana, Oregon, Wyoming, Idaho and Washington States, and also from British Columbia and Australia. Although the disease is recorded in five States only, the tick is found over a range of thirteen States. In the Rocky Mountain area the wood tick is *Dermacentor andersoni*, concerned in Rocky Mountain spotted fever, tularaemia, tick paralysis and Colorado tick fever. In Australia the cause seems to be the common scrub tuck, *Ixodes holocyclus*.

Attempts to reproduce the disease in animals by the *D. andersoni* have been unsuccessful, even when the same tick from an actual patient has been applied ; it must be noted, however, that the engorged female usually refuses to feed. Though the dog tick, *Rhipicephalus sanguineus*, has never been reported as causing the disease in nature, experimentally the eggs have been found capable of doing so.

In nature, man is an accidental host, the tick being primarily a parasite of small rodents. The adult female lays about 300 eggs daily and a total of about 6,000. The evidence so far available points to the eggs or the egg-laying as responsible for the symptoms, for injection of emulsion of eggs in saline subcutaneously or intraperitoneally into dogs sets up the train of symptoms. There was no effect when they were administered *per os*.

Details are given of the case of a girl, 6 years of age, who complained of itching and burning pain in fingers and toes, soon followed by ataxia, increasing muscular weakness, loss of deep reflexes—in fact, symptoms typical of lower motor neuron lesion, not of the peripheral nerves, but of the anterior cornual cells—" a mild irritative lesion of the posterior sensory roots and a severe irritative lesion of the anterior horn cells of the cord." There was no involvement of the cranial nerves in this case. Examination revealed an engorged tick on the scalp. Recovery was complete in 48 hours after its removal, though it is probable that, had it not been found, death would have resulted from respiratory paralysis. The suggestion is made that the tick produces excessive egg venom early in the egg-formation stage and excretes it by the enlarged over-active salivary glands. [An instructive article which should be read in the original. Knowledge of the condition should be disseminated in areas where it is liable to occur, for many physicians may not be aware of it ; recovery soon follows removal of the tick, but death may result from failure to recognize the train of symptoms.] *H. H. S.*

GIBBES (J. Heyward). **Tick Paralysis in South Carolina.**—*Jl. Amer. Med. Assoc.* 1938. Sept. 10. Vol. 111. No. 11. pp. 1008–1009. With 3 figs.

Tick paralysis, an ascending paralysis of the Landry type, has been recognized in some mid-western States for a number of years. The case now reported from South Carolina is the first to be recognized in the eastern states. The patient was admitted to hospital with weakness and incoordination of the legs, absent knee jerks but normal sensation responses. The weakness and ataxia spread rapidly to the arms, and speech became thick, but there was no difficulty in swallowing. At this point, while the condition was becoming worse, a distended

wood tick was found attached to the right occiput. It was removed and the patient rapidly and completely recovered. The patient was afebrile except for a temperature of 100°F. on the evening of the first day in hospital.

It is supposed that this condition is due to a toxin from the salivary glands of the tick. *D. andersoni* was responsible for a similar case in the State of Washington. As Rocky Mountain spotted fever has been reported from South Carolina it is possible that this case of tick paralysis (a totally different condition, but caused by the same tick) may be a precursor of other cases, which can be handled effectively only if promptly recognized. It is thought that ticks of the genus *Ixodes* may also cause the condition. *C. W.*

Mail (G. Allen). **Tick Paralysis in British Columbia.**—*Bull. Brit. Columbia Board of Health.* 1938. Oct. Vol. 8. No. 15. pp. 195–197.

A fatal case of tick paralysis in a girl aged 3 is recorded. Two ticks, one a large fully engorged female, were found over the occipital protuberance and removed, but as the respiratory muscles were affected when this was done, the child died within a few hours. More than 150 cases of this disease, many of which were fatal, are recorded in the files of the Division of Entomology at Kamloops, and every year sheep, cattle and, more rarely, horses succumb to it. It is therefore important that it should be recognized.

Symptoms are detailed and it is pointed out that the ticks may be attached to any part of the body. From the first appearance of symptoms to complete paralysis and death may be as short a period as 2 days, but is more usually 3 to 5. Complete and early removal of the ticks and mouth parts, by excision if necessary, is essential.

The tick chiefly incriminated is the common wood tick *Dermacentor andersoni* Stiles. *Ixodes ricinus* Linn., the coast tick, though not known to produce paralysis, may give rise to troublesome ulcers.

C. W.

Robinow (Meinhard) & Carroll (T. B.). **Tick Paralysis due to the Bite of the American Dog Tick. Report of a Case observed in Georgia.**—*Jl. Amer. Med. Assoc.* 1938. Sept. 17. Vol. 111. No. 12. pp. 1093–1094. With 1 map.

The onset of tick paralysis is sudden and its progress rapid. Flaccid paralysis begins in the legs and spreads to the arms and neck. Speech and deglutition become difficult, the pupils dilate and death may supervene from respiratory paralysis. Early removal of the tick is followed by rapid recovery, but delay may be dangerous. Paralysis seems to occur only after the impregnated female tick has fed for several days on a patient, and is probably not due to a living virus but to a venom elaborated in the developing ova. *Dermacentor andersoni*, which is also a vector of Rocky Mountain spotted fever, tularaemia, relapsing fever and probably Colorado tick fever, has been responsible for all human cases so far reported in the United States and Canada.

The case here reported is the first from Georgia and the tick was, unlike the others, *Dermacentor variabilis*. The patient was a girl of 9 years, who was acutely ill, and showed a temperature of 100·6°F. on admission to hospital. There was flaccid paralysis of the legs,

incoordination of the arms, thickness of speech and nystagmus with normally reacting pupils. Examinations of the cerebrospinal fluid, blood, urine and faeces were negative. Two ticks were first found, one engorged female and one male, attached to the scalp. Recovery promptly followed the removal of these. Later, a second female, showing no signs of engorgement, was found and removed.

C. W.

WEBER (Neal A.). **The Sting of an Ant.**—*Amer. Jl. Trop. Med.* 1937. Sept. Vol. 17. No. 5. pp. 765–768. With 1 fig.

The Ponerinae subfamily of ants possess a well-developed sting and a virulent poison. In Central and South America a widespread species is *Paraponera clavata* Fabr., about an inch in length, blackish-brown in colour, with large mandibles. It is known in Venezuela as the Cumanagato and as the " viente cuatro hormiga " or " 24-hour ant " because it is believed to kill a man in 24 hours, in British Guiana as the Munuri, and in Brazil as the Tucandeira. If a nest is disturbed they emerge in large numbers and attack and may climb trees and drop on the intruder. If stung by many, a man might die in 24 hours, for the author's account of being bitten by a single specimen shows that the sting is severe. He was stung through heavy khaki on the knee and in eight minutes there was a " white welt " with inflamed periphery and a burning sensation ; the site was bathed with ammonia, on the idea that the poison was formic acid, and a wet ammonia pack applied. For the next two hours the burning sensation was intense and the limb seemed paralysed ; these sensations then gradually

Blister caused by sting of *Paraponera clavata* Fabr.
[Reproduced from the *American Journal of Tropical Medicine.*]

disappeared, but 4½ hours after the stinging there was a blister 53 mm. long, 20–29 wide and 7 mm. in height with a reddened base with vesicles. The knee felt stiff and 24 hours later there was an inflamed area 60 × 70 mm. and the blister which had been opened had re-formed and the rest was covered with small vesicles. Four days after the injury the area was still red and the large blister discharged pus; the redness remained for another week and the wound did not heal completely till 19 days after its being inflicted. [Since some of the poison was probably absorbed by the clothing and the patient did not, therefore, receive the full dose, it is obvious that multiple stings might be very serious. The nature of the venom should be investigated.]

H. H. S.

MALARIA.

Précis of Abstracts in this Section.

Tchitchibabine and Hoffmann (p. 580) use a test in which HIO_3 is the reagent for detecting plasmoquine in urine. One tenth mgm. per litre can be identified.

In the paper by Farinaud (p. 581) is given an account of the prophylactic measures necessary during military operations in Indo-China. Shipizina (p. 581) shows that mixtures of larvicides with large volumes of talc such as 1 in 50 or 1 in 100 are inefficient and costly. The resistance of larvae to the action of arsenical poisons increases with age. Davey and Gordon (p. 582) recommend that the maximum size of aperture for screening against mosquitoes in West Africa must not exceed 0·047 inch. This is provided in a screen of 16 meshes to the linear inch composed of wire of 28 S.W.G.

Milam and Coggeshall (p. 583) infected 30 white and 12 negro patients with *P. knowlesi* by inoculation. The negroes were less susceptible than the whites, and reinoculations were failures. Sinton *et al.* (p. 583) failed in an attempt to infect two patients with *P. cynomolgi*.

Das Gupta and Chopra (p. 583) consider that in monkey malaria prontosil soluble is less satisfactory than atebrin.

The paper by Manwell (p. 584) is concerned with the identification of those species of bird malarial parasites which are well established.

Hegner and Wolfson (p. 584) found exo-erythrocytic schizonts (which they call *Toxoplasma*-like parasites) in association with *P. cathemerium*, *P. relictum* and *P. nucleophilum*. Attempts to separate *P. cathemerium* from the schizonts failed but the authors still hold that it is not proved that the schizonts belong to the plasmodium. Wenyon disagrees with this and contends that toxoplasms reproduce by binary fission and cannot be likened to the schizonts in question.

Hewitt (p. 585) discovered that in *P. cathemerium* infections the ring forms prefer young red cells. Multiple infections occur early in the cycle but diminish later owing to destruction of the multiple-infected cells. The proportion of multiple infections varies inversely as the proportion of young red cells.

Hegner and Eskridge (p. 585) found that the serum of birds in the acute phase of infection with *P. cathemerium* is able to ward off the ill effects of this infection if injected into others, but cannot suppress the infection, since the parasites are as numerous in them as in controls.

Bloom and Taliaferro (p. 586) describe the common infarcts in the spleens of canaries infected with *P. cathemerium* which result from thrombosis of the splenic veins. These regenerate completely, the process being initiated by macrophages followed by infiltration of lymphocytes. Decourt and Schneider (p. 586) found evidence to suggest that malarial parasites in fowls infected with *P. gallinaceum* are stored in masses of lymphoid tissue when they cannot be found in the spleen. No recognizable parasites can be seen, but they may exist as certain granules found within lymphoid cells.

Bishop *et al.* (p. 587) show that *P. relictum* infection may persist in canaries for more than 8 years. Basu (p. 587) describes a parasite of herons in India for which he proposes the name *P. heroni*. Development was observed up to the oöcyst stage in *Culex fatigans*. Manwell and Haring (p. 588) show that *P. vaughani* and others of the *P. rouxi* type in birds are highly susceptible to both atebrin and plasmoquine.

C. W.

Tchitchibabine (A.) & Hoffmann (Ch.). Méthode d'identification des gamétocides synthétiques dans l'urine par une réaction colorée. [**Method of Identification of Synthetic Gametocides in the Urine by a Colour Reaction.**]—*Bull. Soc. Path. Exot.* 1938. Oct. 12. Vol. 31. No. 8. pp. 740–742.

The authors report that iodic acid HIO_3 is a much more sensitive reagent for the detection of plasmoquine in the urine than is chloranile (tetrachloroquinone) which was recommended by Schulemann, Schönhoefer & Wingler. The test is carried out as follows :—

200 cc. of urine are made alkaline by the addition of 50 cc. of a 30 per cent. solution of caustic soda. This is then extracted thrice, in a separating funnel, with ether, 25 cc. each time. The ethereal solution, 75 cc., is shaken with a few grammes of anhydrous potassium carbonate and then filtered into a 250 cc. separating funnel. Five cc. of 10 per cent. sulphuric acid are added : after shaking, the lower layer is decanted into an ordinary test tube. The contents of the tube are gently boiled for 30 seconds to drive off the ether. After complete cooling under running water 2 cc. of a 10 per cent. watery solution of iodic acid are added ; the tube is then shaken and left to settle.

If plasmoquine is present in the urine a violet colour develops in 2 or 3 minutes : this darkens somewhat and lasts for nearly half an hour. By this method it is possible to identify plasmoquine in quantity as small as a tenth of a milligramme per litre of urine. Rhodoquine and plasmocide also give colour reactions with this test. With plasmocide the colour only appears after a delay of 15 to 20 minutes, as compared with 2 or 3 minutes with plasmoquine. If appreciable quantities are present plasmoquine gives a violet blue colour, plasmocide violet red. With plasmoquine the colour persists for about half an hour, with plasmocide it begins to fade after a quarter of an hour.

Norman White.

Farinaud (M. E.). La prophylaxie du paludisme dans les troupes en campagne. [**Malaria Prophylaxis among Troops on Service.**]—*Ann. de Méd. et de Pharm. Colon.* 1938. July–Aug.–Sept. Vol. 36. No. 3. pp. 583–608. With 4 charts.

Three examples are given from the military history of French Indo-China of the havoc caused by malaria during military operations in the hilly interior of that country. There follows an excellent account of the prophylactic measures that could and should be taken to prevent or mitigate such catastrophes. The recommendations contain nothing new or original. Examples are given of the results obtained by drug prophylaxis in malarious posts. The paper is designed primarily for the benefit of the military medical officer. *N. W.*

Shipizina (N. K.). A propos de l'action des poudres insecticides sur la larve d'anopheles en relation avec le degré de dispersion des toxiques et de la concentration des substances ajoutées. [**Action of Insecticide Powders on Anopheline Larvae in Relation to the Degree of Dispersion of Toxic Substance and the Concentration of Added Substances.**]—*Med. Parasit. & Parasitic Dis.* Moscow. 1938. Vol. 7. No. 3. [In Russian pp. 346–370. With 13 figs. [18 refs.] French summary pp. 371–372.]

Increase in the concentration of substances such as talc added to toxic powder larvicides prolongs the death time of larvae. Thus mixtures of 1 in 50 or 1 in 100 are much slower in action than a mixture of 1 in 10 and the percentage of larvae destroyed is less. The presence of detritus in suspension, protozoa, etc., in natural breeding places explains why the action of larvicides is sometimes slower there than in the laboratory, other conditions being equal. The solid pellicule formed by diluents in excess results in a slowing down of the filtration in the larva. This is most marked in young larvae whose filtering apparatus overcomes with difficulty the force of adhesion of the particles of talc. Another result is that the concentration of the toxic substance in the intestine of the larva is considerably diminished. Experiments have shown that the mixture of the larvicide with a large volume of talc, such as 1 in 50, 1 in 100, is irrational from the point of view of the alimentary physiology of larvae, and is unnecessarily costly.

The resistance of larvae to the action of arsenical poisons increases with age. For young larvae arsmal is more toxic than Paris green; it is a finer powder with a higher degree of dispersion; its arsenic content is not sufficiently high for fourth stage larvae. Relative to the size of their bodies young larvae have a stronger capacity of filtration than fourth stage larvae. In natural conditions the food of a larva takes from 30 to 60 minutes to pass from the anterior end of the oesophagous to the anterior end of the posterior intestine, at a temperature of 25°. When poison is taken the intensity of filtration, and consequently the rate at which food passes through the alimentary canal, depends on the dose. If more than a lethal dose is taken filtration and the passage of food stops in from 10 to 20 minutes; in such cases the poison does not pass beyond the anterior end of the stomach. With lesser doses this action is delayed but there is no possibility of the expulsion of the poison before the commencement of such action.

N. W.

DAVEY (T. H.) & GORDON (R. M.). **The Size of Aperture Necessary in Screencloth intended for the Protection of Dwellings in West Africa.** —*Ann. Trop. Med. & Parasit.* 1938. Dec. 21. Vol. 32. No. 4. pp. 413–424. With 3 figs. [10 refs.]

In July 1937 it was reported from the Gambia (and confirmed by the authors) that mosquitoes were getting through the screens at the Government Hospital. These screens were composed of wire of No. 30 Standard Gauge with 14 meshes to the linear inch giving apertures of 0·059 of an inch. Consequently, BLACKLOCK [this *Bulletin*, 1938, Vol. 35, p. 259] stated that screencloth of this type was clearly unsafe for West African conditions. The authors then commenced experiments in order to select a screencloth which, while admitting the maximum amount of air and light, would be capable of excluding mosquitoes from dwellings.

Screencloths chosen for the experiment were :—

(*a*) 14 mesh, 30 S.W.G., aperture 0·059 inch (1·5 mm.).
(*b*) 16 ,, 30 ,, ,, 0·050 ,, (1·3 mm.).
(*c*) 16 ,, 28 ,, ,, 0·047 ,, (1·2 mm.).
(*d*) 18 ,, 30 ,, ,, 0·043 ,, (1·1 mm.).

16,000 mosquitoes were used, chiefly " wild " *Anopheles gambiae* and *A. funestus* ; other species included *Aëdes vittatus* and *A. simpsoni*. Specially designed cages were employed but as mosquitoes which passed through the screens were not actually seen doing so a separate cell was constructed of glass in which the movements of the insects could be observed under a magnifying glass. The apparatus and the attitudes of mosquitoes passing through the mesh are illustrated in text figures.

The experiments showed that *Anopheles gambiae* and *A. funestus* were able to pass through the apertures of 0·059 of an inch in screen (*a*), *A. funestus* could pass through the apertures of 0·050 of an inch in screen (*b*) and that neither species passed through apertures of 0·047 and 0·043 of an inch in screens (*c*) and (*d*) respectively. The two species of *Aëdes* were able to pass through the apertures in screen (*a*) but were not tested with the other screens.

The authors recommend that the maximum size of aperture for screening against mosquitoes in West Africa must not exceed 0·047 of an inch (1·2 mm.) ; this aperture is provided in a screen having 16 meshes to the linear inch composed of wire of 28 Standard Wire Gauge.

[The requisite aperture could be obtained by using the thinner, stronger and more durable stainless steel. The greater number of meshes to the linear inch would admit more air and light while affording the same protection. Objections that the steel is not always stainless and that the initial cost is high, have been made, but as the production of really stainless steel becomes perfected and the demand increases it should soon be possible to supply a screencloth of great durability at a reasonable price.]

There is some confusion in the literature about the formula for designating different types of screencloth ; the important point, however, is the size of the aperture, so the formulae of previous investigators are converted into sizes of apertures in inches and the results of their experiments tabulated. From this table it is seen that there are no published records of mosquitoes passing through apertures

less than 0·048 of an inch (1·2 mm.) and that very little work has been done on Culicines.

Observations made on the movements of mosquitoes while penetrating the screens show that the thorax enters the aperture diagonally. The legs of a mosquito do not prohibit its passage ; inability to pass depends upon the dorso-ventral diameter of its thorax.

[There will be many to whom this work is of considerable practical interest though some readers may not understand that the two names *A. gambiae* and *A. costalis* refer to the same mosquito.] *H. S. Leeson.*

Milam (D. F.) & Coggeshall (L. T.). **Duration of *Plasmodium knowlesi* Infections in Man.**—*Amer. Jl. Trop. Med.* 1938. July. Vol. 18. No. 4. pp. 331–338.

The paper reports that 30 white and 12 negro patients with general paresis were infected by inoculation with *Plasmodium knowlesi* as a therapeutic measure. In the white patients the parasites first appeared in the blood as early as the third day and as late as the eighteenth day and they persisted for three to fourteen days. As tested by injection into susceptible monkeys the blood was negative on the 18th to 131st day after the original inoculation. Of the patients found negative by monkey inoculations 18 were re-inoculated with intervals of 30 to 491 days and all proved refractory. The negro patients were less susceptible than the white and the duration of visible infections varied from 2 to 11 days. The blood was infectious to monkeys as late as the 36th day and non-infectious as early as the 28th day. Re-inoculations proved unsuccessful. It is noted that in the case of one negro the blood was infective to monkeys from the 2nd to 18th day, though parasites were never detected in the blood smears. It seems that similar invisible infections may occur with human malaria and the failure to recognize them is due to the want of a sufficiently sensitive host. *C. M. Wenyon.*

Sinton (J. A.), Hutton (E. L.) & Shute (P. G.). **Failure to transmit an Infection of *Plasmodium cynomolgi* to Man by Blood Inoculation and by Mosquito Bites.**—*Jl. Trop. Med. & Hyg.* 1938. Aug. 1. Vol. 41. No. 15. pp. 245–246. [16 refs.]

The paper describes unsuccessful attempts to infect two human beings with *Plasmodium cynomolgi*. In one case the patient received infected monkey blood intramuscularly and sporozoites intravenously, while in the second case infected mosquitoes were allowed to bite the patient, who also received an intravenous injection of sporozoites. It is of interest to note that the strain of parasite had been sent by air mail from India in defibrinated monkey blood to which 0·2 cc. of 50 per cent. dextrose solution was added per 10 cc. of blood. Though the blood had been exposed to the ordinary climatic conditions on the journey of seven days, a monkey was successfully infected in London. Of a number of *Anopheles maculipennis* var. *atroparvus* fed on an infected monkey, 36 per cent. became infected. *C. M. W.*

Das Gupta (B. M.) & Chopra (R. N.). **Studies on the Action of Synthetic Drugs on Simian Malaria. Sulphonamide Derivatives.**—*Indian Med. Gaz.* 1938. Nov. Vol. 73. No. 11. pp. 665–667.

The authors have treated monkeys inoculated with *P. knowlesi* with prontosil soluble administered intravenously. They have found

that daily doses of 0·5 and 1 cc. are insufficient to check the infection. Larger doses (3 cc. daily for three days) are sufficient to bring about a cure but these are quite out of proportion to the human doses. In its action the drug resembles quinine, but for the cure of an infection it is less satisfactory than atebrin. *C. M. W.*

MANWELL (Reginald D.). **The Identification of the Avian Malarias.**—*Amer. Jl. Trop. Med.* 1938. Sept. Vol. 18. No. 5. pp. 565–575. [26 refs.]

The increased interest which has been taken in bird malaria during recent years has resulted in the establishment of a number of new species of bird malarial parasite. Some of these are undoubtedly good species, while others are doubtful. In this paper the author discusses the differentiation of about a dozen species which appear to him to be well established. He gives a useful key which will enable observers to separate the species on morphological grounds, while in a table is set forth a comparison of the infections which are produced in canaries by a number of species inoculable to these birds.

The paper is one which must be consulted by those engaged in the identification of bird malarial parasites. *C. M. W.*

HEGNER (Robert) & WOLFSON (Fruma). **Association of *Plasmodium* and *Toxoplasma*-like Parasites in Birds.**—*Amer. Jl. Hyg.* 1938. Nov. Vol. 28. No. 3. pp. 437–454. With 11 figs. [20 refs.]

The authors revert [this *Bulletin*, 1938, Vol. 35, p. 730] to the subject of the exo-erythrocytic schizonts which have been assumed to be stages of development of certain bird malarial parasites and the possible relationship of these to the common toxoplasms of birds. Twelve strains of bird malarial parasites belonging to eight species have been examined in various birds, chiefly canaries, and the schizonts in question have been found in association with *P. cathemerium*, *P. relictum* and *P. nucleophilum*. The general account is somewhat obscured by the use of the expression *Toxoplasma*-like parasite for the exo-erythrocytic or endothelial schizonts which most observers have assumed to be stages of development of the malarial parasites with which they appear to be always associated.

The histories of a number of transmissions of strains are given and the presence or absence of the schizonts is discussed. Attempts to separate *Plasmodium cathemerium* from the exo-erythrocytic schizonts (*Toxoplasma*-like parasites) failed, though the experiments involved sub-inoculations, passage through mosquitoes, treatment with quinine, differential viability, inoculation into chicks and centrifugation. In spite of this it is still held that it has not yet been proved that the schizonts belong to the plasmodium.

[To the reviewer it seems that such a discussion is hardly likely to solve the problem, if, indeed, there is a problem, for no observer has yet shown that a bird toxoplasm, which is only known as the small rounded parasite in the nuclear notch of a blood leucocyte, ever reproduces by schizogony in endothelial or other cells or gives rise to schizonts of the type under discussion. The expression *Toxoplasma*-like would bring to mind the fairly characteristic intra-leucocytic forms just referred to and would not suggest large multinucleate schizonts, which are not known as stages of development of toxoplasms. In all recent work that has been carried out there has been a complete

failure to demonstrate for the toxoplasms any other type of reproduction than binary fission. Recent observations by the reviewer of a strain which was inoculable to both birds and mammals are in support of this, while he is of the opinion that the toxoplasms are not protozoa at all but that they are vegetable organisms related to *Histoplasma capsulatum* or similar yeast-like parasites.] *C. M. W.*

Hewitt (Redginal). **Multiple-infected Red Cells in Avian Malaria.**—*Amer. Jl. Hyg.* 1938. Nov. Vol. 28. No. 3. pp. 321–344. With 3 figs. & 1 plate. [20 refs.]

A study of *Plasmodium cathemerium* infections in canaries has shown that at the beginning of the 24-hour cycle of the parasite as many as 100 per cent. of the ring forms of the parasite are in young red cells. Of these infected cells 66 per cent. contained a single parasite, the rest harbouring two, three, four or five. As the cycle progressed the percentage of multiple infections diminished till finally no cells with more than two parasites could be found. It was evident that with the growth of the parasite the cells were unable to withstand more than two parasites and those with three or more had been destroyed.

Generally speaking the number of multiple infections bore a relationship to the percentage of young red cells present at the time of sporulation. Where 100 per cent. of the red cells were young no multiple infections occurred. With reduction in the percentage of young red cells in the blood there was an increasing number of multiple infections, a state of affairs which seems to indicate a preference on the part of the merozoites for young cells even when this entails producing multiple infections. When all the red cells are young the merozoites have little difficulty in finding suitable cells. Similarly, by increasing the percentage of young red cells in the blood by treating the birds with phenylhydrazine the number of multiple infections became reduced. Generally the distribution of the parasites in the young red cells was found to be such as would have occurred if no mature cells had been present. *C. M. W.*

Hegner (Robert) & Eskridge (Lydia). **Passive Immunity in Avian Malaria.**—*Amer. Jl. Hyg.* 1938. Nov. Vol. 28. No. 3. pp. 367–376. With 2 figs.

In an experiment to discover if the blood of birds infected with *Plasmodium cathemerium* contains substances capable of protecting against infections in other birds, the following experiments were carried out. Serum from healthy birds, from birds which had passed the acute phase of an infection and from birds in the acute phase was prepared and dried. Birds injected with the healthy serum were found to be more susceptible to infection than normal birds. The same was true of birds injected with the second type of serum, but birds injected with the acute serum did not appear to suffer from the infection which followed inoculation though, as regards numbers of parasites, the infections were as intense as in the other treated birds. It would appear that the serum of birds in the acute phase of infections contains some substance which is unable to suppress the infection in fresh birds, though it is capable of warding off the ill effects of this infection. Before pronouncing finally on the question the authors propose carrying out further experiments to test this view more fully. *C. M. W.*

Bloom (William) & Taliaferro (William H.). **Regeneration of the Malarial Spleen in the Canary after Infarction and after Burning.**—*Jl. Infect. Dis.* 1938. July–Aug. Vol. 63. No. 1. pp. 54–69. With 5 plates. [21 refs.]

It is a common occurrence for infarcts to form in the spleens of canaries infected with *Plasmodium cathemerium*. They are haemorrhagic in character and result from thrombosis of the splenic veins. They extend from the hilum to the capsule, which does not become involved in the primary necrotic process. Such infarcts, even when large and involving the entire spleen, become completely regenerated. The first step in repair is the appearance of macrophages between the healthy spleen and capsule tissue and the necrosed area. These macrophages arise from the reticular cells, macrophages and lymphocytes of the adjacent healthy tissues and from haematogenous agranulocytes (lymphocytes and monocytes). A young scar is formed containing many fibroblasts and macrophages. The scar is then infiltrated with lymphocytes which migrate from the healthy tissue and blood vessels or arise *in situ* by the transformation of fibroblasts into large lymphocytes and the proliferation of medium and large lymphocytes. Nests of proliferating lymphocytes associated with the smaller arteries give rise to new nodules, while the fibroblasts become the reticular cells of both the red and white pulp. The venous sinuses arise from the scar capillaries.

The same type of regeneration follows experimental burning of the tip of the spleen but it is slower, owing probably to the absence of the capsule which the operation of burning has destroyed. *C. M. W.*

i. Decourt (Ph.) & Schneider (J.). Les lacunes de nos connaissances sur le cycle plasmodial chez l'hôte vertébré. [**Gaps in our Knowledge of the Plasmodial Cycle in the Vertebrate Host.**]—*Bull. Soc. Path. Exot.* 1938. July 6. Vol. 31. No. 7. pp. 603–609. [22 refs.]

ii. —— & ——. Note préliminaire sur la recherche de la localisation et de la morphologie des plasmodes pendant les périodes d'infestation latente. [**Localization and Morphology of Plasmodia during Latent Infestation.**]—*Ibid.* pp. 609–614.

i. In the first of these papers the authors review the observations which have been made to discover the fate of malarial sporozoites which have been injected by mosquitoes. The question as to what happens to them between their injection and the appearance of malarial parasites in the blood still remains unanswered. The view held by some that the recently discovered endothelial schizonts are developed only from sporozoites the authors regard as untenable. They believe that these schizonts are not essential stages in the development of malarial parasites but are rather accidental by-products of the normal cycle. They are of irregular occurrence and are found in very varying numbers in infections following direct blood inoculations as well as sporozoite infections.

ii. In the second paper are recorded experiments which were suggested by observations which had been made on the property of mesenteric lymphatic glands to store up bacilli such as those of typhoid fever and to discharge them with pathogenic effects when certain stimuli were applied to the splanchnic nerve. It seemed possible that

malarial parasites might similarly be stored in the lymphatic glands, particularly as prolonged search for parasites had been carried out without result in practically all other organs and tissues of the body during the latent phases of infection.

The experiments were carried out with *Plasmodium gallinaceum* of fowls. In the place of actual glands the fowl possesses masses of lymphoid tissue. An emulsion of such tissue from a fowl which had apparently recovered from its infection injected in very small dose (0·002 cc.) into a clean fowl produced an intense infection, whereas the injection of large quantities of spleen emulsion failed to infect. A similar result was obtained by injection of a small dose of thymus emulsion. A microscopic examination of the infecting material did not reveal any recognizable malarial parasites. On the other hand in the cytoplasm of the lymphoid cells were found red to purple staining granules 1 to 1·5μ in diameter. Similar granules have also been seen in the large lymphocytes of the blood, but only just before the appearance of malarial parasites in the red blood corpuscles. The granules have never been found in healthy birds. A possible light was thrown on the nature of these granules by observations made on the behaviour of malarial parasites kept in sodium citrate solution at 28°C. The parasites within the red cells were seen to break up into daughter cells and these, without leaving the cell, became transformed into chromatin-like granules resembling those mentioned above.

It is evident that further study is required before a final opinion can be given on the part played, if any, by these granules in the development of malarial parasites, but the result of this is promised soon. *C. M. W.*

Bishop (Ann), Tate (P.) & Thorpe (Mary Vincent). **The Duration of *Plasmodium relictum* Infection in Canaries.**—*Parasitology.* 1938. Sept. Vol. 30. No. 3. pp. 388–391.

It has been shown that infections of *Plasmodium relictum* may persist in the peripheral blood of canaries as ordinary schizogonic stages for as long as 8 years and 3 months and that during this period the blood is infective to clean birds. *C. M. W.*

Basu (B. C.). **Studies on a Malarial Infection in a Paddy Bird.**—*Jl. Malaria Inst. of India.* 1938. Sept. Vol. 1. No. 3. pp. 273–284. With 1 text fig. & 14 figs. on 1 plate. [64 refs.]

The parasite described from India appears to be a new species for which the name *Plasmodium heroni* is proposed. It occurs in the pond heron, *Ardeola grayi* Sykes, in which it produces frequently a heavy and fatal infection. The schizonts give rise to 6 to 26 merozoites, the larger schizonts often occupying the side of the red cell and encircling the nucleus. The gametocytes are elongate, while the pigment is brownish black in colour. The infection was readily inoculable from heron to heron but not to sparrows, crows, domestic fowls or canaries. Development in *Culex fatigans* up to the oöcyst stage was observed. A search of the internal organs of infected birds failed to reveal any endothelial schizonts such as have been described for *P. gallinaceum.* *C. M. W.*

MANWELL (Reginald D.) & HARING (Ann T.). **Plasmochin and Atebrin Therapy in *Plasmodium vaughani* Infections.**—*Riv. di Parassit.* Rome. 1938. Sept. Vol. 2. No. 3. pp. 207–218. With 24 figs. on 1 plate. [17 refs.]

Infections in canaries of *Plasmodium vaughani*, a bird malarial parasite belonging to the group of small organisms of which *P. rouxi* is the type and *P. hexamerium* and *P. nucleophilum* other members, have been shown, in the experiments recorded in this paper, to be highly susceptible to both atebrin and plasmoquine. Complete sterilization of the birds was obtained with both drugs after about a week's treatment. The other organisms are also susceptible to the drugs, a fact which shows their close relationship to one another. All these parasites resemble one another in that they multiply slowly, while relatively large numbers of organisms are present in the blood of infected birds during the chronic phases of infection. *C. M. W.*

HELMINTHIASIS.

PRÉCIS OF ABSTRACTS IN THIS SECTION.

MENDHEIM (p. 588) mentions Looss's method of collecting helminths for examination.

Helminth eggs were found on the legs of flies by POKROVSKY and ZIMA (p. 589).

AFRICA and DE LEON (p. 589) studied the phagocytic action of giant cells after the eggs of various helminths had been injected into the peritoneum of monkeys. Ascaris eggs are surrounded by the giant cells, the eggs of Fasciola and Schistosoma are crushed or penetrated or pulled asunder by the cells, and heterophyid eggs are surrounded only by histiocytes and endotheliocytes, without giant cells. CULBERTSON (p. 590) states that the immunity developed against helminths is similar to that against other infectious agents both as regards the host and the parasites.

NICHOLLS and GUNAWARDANA (p. 590) describe a method of composting town refuse and night soil which causes the destruction of all Necator material and Ascaris eggs.

The remainder of the abstracts in this section deal with the proportion of the various helminths found in the examination of communities in Africa, America and China. The majority are records of examinations of faeces by different methods, but FISK (p. 591) gives the results of careful examination of the whole of the alimentary tract in 120 consecutive autopsies. *C. W.*

MENDHEIM (H.). Ueber eine Zweckmässige abänderung der Looss'-schen Schüttelmethode nebst Bemerkungen zur helminthologischen Technik. [**A Useful Alteration of Looss's Shaking Method and Remarks on Helminthological Technique.**]—*Ztschr. f. Parasitenk.* 1938. Aug. 19. Vol. 10. No. 3. p. 436.

LOOSS, it is said, advised for the collection of helminths in a state satisfactory for examination that they should be made to extend themselves by shaking the intestinal contents with saturated sublimate

solution, allowing to settle, and adding half saturated sublimate solution. Mendheim advises, apparently as something new and as an improvement, that the worms themselves should be picked out and first washed in water or normal saline. As a stain, para-carmine is advised and for subsequent bleaching some days in undiluted Lugol solution. *Clayton Lane.*

Pokrovsky (S. N.) & Zima (G. G.). Mouches comme transporteurs des oeufs des helminthes dans les conditions naturelles. [**Flies as Carriers of Helminth Eggs in Nature.**]—*Med. Parasit. & Parasitic Dis.* Moscow. 1938. Vol. 7. No. 2. [In Russian pp. 262–263. French summary p. 264.]

Of 1,911 flies examined, 0·47 per cent. carried worm eggs, namely, Diphyllobothrium and Hymenolepis each by 3 flies, Ascaris by 1 and Enterobius by 2, and they did so mostly on their legs. The need for exclusion of flies from shops is stressed. *C. L.*

Africa (Candido M.) & de Leon (Walfrido). **Observations on the Mechanism of Phagocytosis of Various Helminth Ova.**—*Livro Jubilar do Prof. L. Travassos.* Rio de Janeiro. 1938. pp. 1–10. With 5 plates. [10 refs.]

The eggs concerned were those of *Ascaris lumbricoides, Fasciola gigantica*, the heterophyid *Monorchotrema taihokui* and *Schistosoma japonicum*. The method was by serial sections stained with haematoxylin and eosin—in the case of the first three worms of nodules formed in the mesentery and omentum after intraperitoneal injection of the eggs into *Macacus cynomolgus*, in the fourth worm, of natural material from man. The observations were confined as much as possible to the mechanism of the phagocytic action of giant cells, and these are in fact largely pictured as machines.

In the case of Ascaris eggs, a wrapping of giant cells is formed round them but " there seems no attempt on the part of the phagocytes to make an opening on or break the eggshells forcibly." This engulfment is commoner with eggs that have become embryonated, while these cells have appeared as early as 4 and have persisted in a well nourished state till as late as 74 days after inoculation, while in a monkey that died six months after this " only a few giant cells loitering lazily are left around the place where eggs were presumably located before." Fibrosis advances from the periphery of the pseudotubercles formed round egg clusters.

In eggs of Fasciola there is no larval development but the action of the giant cell is described as hugging and crumpling the egg by means of its powerful " arms," battering the shell, getting inside it, expanding and cracking it into fragments, or acting like a steam roller upon an empty egg. As to schistosome eggs three mechanical mental pictures are drawn of the giant cell :—A fracture of the shell by marshalling of the nuclei into a wedge and forcing this into the shell by the action of the attacking cell's cytoplasm ; an encirclement without a nuclear wedge so that centripetal pressure breaks the shell at its weakest point ; and an anchoring of cytoplasmic processes at convenient points in the surrounding fibrous tissue, a simultaneous pull from all directions and the tearing asunder of the whole shell. Heterophyid eggs do not evoke giant cells, only " sheets of pure histiocytes and

endotheliocytes in fibrous tissue stroma . . . This very noticeable indifference of the giant-cells towards heterophyid eggs, we will interpret . . . as an example of negative chemotaxis." *C. L.*

CULBERTSON (James T.). **Recent Contributions to the Immunology of Helminthic Infections.**—*Arch. Pathology.* 1938. Jan. & Feb. Vol. 25. Nos. 1 & 2. pp. 85–117 ; 256–280. [5 pages of refs.]

A summary of the literature on immunity to helminths (which has, at least in the main, been abstracted in this *Bulletin*) is summed up thus :—

" It is apparent from what has been given here that the subject of immunity against helminths has been attacked by a large number of workers and that their contributions have covered many aspects of the whole field. Although there are still some who hesitate to agree that immunity to any helminth has been experimentally established (Schmid), the great majority of workers are more favourably inclined and tend to assume the point of view that the mechanism of immunity against helminths is similar to that against other infectious agents. The manner in which the state of immunity against helminths is attained, the humoral and cellular responses of the immune host against these parasites, and the effects of the defense agencies of the host on the parasites are so nearly identical with the immune phenomena associated with other types of infectious agents that one must either accept the fact that immunity is developed against the helminths or believe that no immunity is manifested against any agent of disease."

NICHOLLS (Lucius) & GUNAWARDANA (Samson A.). **The Destruction of Helminth Ova in Night Soil by Composting.**—Reprinted from *Ceylon Jl. Sci.* (Sect. D., Med. Sci.). 1939. Feb. 11. Vol. 5. Pt. 1. 8 pp. With 5 figs. on 1 plate.

In Ceylon, night soil is in places disposed of by composting, which produces fine odourless mould valuable as a manure. This investigation was undertaken to determine whether the rise in temperature which occurs in the process sufficed to destroy the free living ankylostome and Ascaris stages.

The town refuse, freed from pots, pans, coconut husks and suchlike is stacked in rectangles of 6 by 4 feet and 4 feet high ; in each rectangle is dug a trench 4 by 2 feet and 2 feet deep which is filled with night soil and covered with the refuse which had been dug out ; the whole is then sprinkled with water daily for a week. The rectangle is then so mixed that the edges become the middle. In the middle is then dug a trench corresponding to 7 per cent. of the volume of the rectangle, and this is filled with night soil, covered and watered as before for another week. At the end of 2, 3 and 4 weeks this mixing, trenching, covering and watering are repeated but the amounts of faeces added are respectively 5, 3 and 3 per cent. of the volume of the heap. No further addition of faeces is made, but the daily moistening and weekly turning over are continued for 3 months, by which time the material has become a fine mould. The fermentation which has been going on has raised the temperature, this rise is greatest at the junction of faeces and refuse, and in all but one of the heaps tested it reached 60°C., in the exception 57°C. Controls showed that a temperature of 45°C. killed all Necator material within 2 hours, and one of 42°C. within 12 hours ; in the final compost all Ascaris eggs were dead and any

larvae present were those of free-living nematodes. The turning over of the rectangular heaps in the manner described is a completely essential part of the procedure, which was as effective in the rains as in the drier seasons. *C. L.*

Fisk (Guy H.). **Helminthiasis in Lagos, Nigeria.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1939. Feb. 28. Vol. 32. No. 5. pp. 645–652.

The results of a count of gastro-intestinal worms obtained at 120 consecutive routine autopsies.

The whole gastro-intestinal tract was opened and its mucosa scraped in a white tray, visible worms were picked out, and the faecal matter washed with sedimentations, usually about 12, till no more worms were found. Search was not made for Strongyloides, though these showed as larvae in nearly every stool examined in the laboratory, while examination for schistosomes was limited to the microscopic investigation of material scraped from suspicious-looking patches on the mucosa of the bladder. Six of the cases were under 5 weeks old, and had no parasites, and of the remaining 114 the infection rate was just over 90 per cent., while in those over 15 months it was 96. There were 47 Necator infections with 1,870 worms in all, the highest number in one person being 184; for Ancylostoma the corresponding figures were 22, 368 and 147; for Ascaris 90, 1,117 and 76; for Trichuris 72, 895 and 89. Of these worms the proportions of males to females varied from 1 to 1·5 in Ascaris, 1 to 2 in Trichuris and Ancylostoma and 1 to 3 in Necator. *Taenia saginata* was present 4 times, whereas in Northern Nigeria the percentage of incidence is about 50; in the former area meat is little eaten. Schistosome eggs were found in 8. In a child of 1 month and 8 days there were 9 Necator and 147 Ancylostoma, this is the only person who died as the direct result of infection, and it is suggested that her mother must have set her down on the ground near a latrine. [Foster (this *Bulletin*, 1933, Vol. 30, p. 221) found that in pre-natal infection of a bitch with *A. caninum*, eggs appeared in her pups' faeces eleven days after infection, great care having been taken to prevent their infection after their birth. *A. caninum* is very near to *A. duodenale* anatomically.] Hookworm infections are held to be often an indirect cause of death. No Enterobius were apparently recovered from the lengths of intestine removed. *C. L.*

van den Berghe (Louis). Les parasites intestinaux des pygmées Efé de l'Ituri (Congo Belge). [**Intestinal Parasites of the Efé Pygmies of Ituri, Belgian Congo.**]—*Ann. Soc. Belge de Méd. Trop.* 1938. June 30. Vol. 18. No. 2. pp. 293–296.

In spite of their timidity it was found possible to make faecal examinations on 42 male Efé pygmies of pure stock.

The pygmies live in symbiosis with the large negroid Bantus of the Walese race, exchanging meat got by hunting elephant or the small antelope Cephalophus (the latter caught in nets after a beat by the women) for the agricultural produce of the Bantus. Every Walese village has its clan of pygmies living somewhere within 2 or 3 days' march but at no fixed place. The faeces were examined by smear, by centrifugal precipitation with washings and by [? gravity]

floatation in saturated salt solution. The percentages of infection found were Ascaris 22, Necator (established by getting the adults from washed stools) 40, Trichuris 27·5 and *Schistosoma mansoni* 11. No cestodes or Strongyloides were seen. One Planorbis was found after a long search in a small stream, and cysticerci were found in Cephalophus on two occasions. The percentages of infections found in the symbiotic Bantus were : Ascaris 73, Necator 80, Trichuris 15, *S. mansoni* 27·5.

C. L.

Clement (L.). Contribution à l'étude du parasitisme intestinal chez les indigènes du territoire de Ruhengeri (Ruanda). [**On the Intestinal Parasites of the Inhabitants of Ruhengeri (Ruanda).**]—*Ann. Soc. Belge de Méd. Trop.* 1938. June 30. Vol. 18. No. 2. pp. 347–349.

A report on examinations of faeces from 19,083 children between the ages of 2 or 3 and 15 or 16, the method of examination being unstated.

The percentages of detected infections were :—Ascaris 94, Trichuris 72, " Taenia " 10·6, ankylostomes 1, Strongyloides 0·1, negative 4·3. Figures for the six different provinces are also given. The low percentage of hookworm infection is due to the cold climate. *C. L.*

Leathers (W. S.), Keller (A. E.) & McPhaul (W. A.). **The Prevalence, Distribution and Intensity of Infestation of** *Ascaris lumbricoides, Trichocephalus trichiura* [*sic*], *Hymenolepis nana, Enterobius vermicularis* **and** *Hymenolepis diminuta* **in Fifty-Six Counties of Florida.**—*Amer. Jl. Hyg.* 1939. Mar. Vol. 29. No. 2. Sect. D. pp. 57–66. [10 refs.]

This paper continues the report abstracted in this *Bulletin*, 1938, Vol. 35, p. 669, this part dealing with the infections, other than those by hookworms, which were discovered by examination of 0·005 cc. of faeces by the Stoll-Hausheer method.

Of the 29,062 faecal specimens from white persons, there was detected Ascaris infection in 1·9 per cent., with an average intensity corresponding to 22,000 eggs per cc. and with highest figures in pre-school and school children. Of these 571 persons, 215 harboured unfertile eggs only, 159 fertile eggs only, and 197 both sorts, the eggs per cc. numbering 3,000, 15,000 and 58,000 respectively. When infection was familial its average weight, as measured by egg numbers, increased in each member of the family in proportion to the number of them which were infected. Of the 4,121 specimens from negroes 6·5 per cent. were positive with an average of 33,600 eggs per cc., and of these 268 persons there were unfertile eggs only in 78, fertile eggs only in 45 and both sorts in 145 ; the eggs numbering respectively 2,700, 18,000 and 56,000 per cc. For Trichuris the percentage of infections detected in white persons was 0·4, though it was as high as 11·9 in St. Johns County, and for negroes 0·19. For infection with *H. nana* the detected percentage was 0·3 in white persons and 0·16 in negroes ; while for *H. diminuta* the corresponding figures were 0·06 and 0·12. *C. L.*

Fonseca (Rafael Calvó), Kourí (Pedro) & Basnuevo (José G.). Porcentaje y distribución geografica de la verminosis intestinal en Cuba. [**Percentage and Local Distribution of Intestinal Worms in Cuba.**]—*Rev. Med. Trop. y Parasit.* Habana. 1938. Sept.–Oct. Vol. 4. No. 5. pp. 231–261. With 5 figs. [29 refs.] English summary.

The method of diagnosis was to suspend a small piece of faeces in water by shaking, to screen and centrifuge after adding a drop of acetic acid and to examine one preparation from the precipitate.

Of 7,246 examinations the percentages of infection discovered were Trichuris 37·44, Ascaris 16·86, Necator 5·97, Enterobius 2·16, Strongyloides 0·33, Taenia 0·2, *H. nana* 0·07, *F. hepatica* 0·04, *Entamoeba coli* 15·72, Giardia 4·25, *E. histolytica* 1·21. The local incidences are given, and it is added that Taenia is most often found in resident Spaniards and Syrians; and that Chinese show a high percentage of infection with Clonorchis, no Cuban, however, being infected. *C. L.*

Walter (E.). Studie ueber die Verbreitung der Helminthen in der Bevölkerung Venezuelas. [**The Distribution of Helminths in Venezuelans.**]—*Ztschr. f. Parasitenk.* 1938. Aug. 19. Vol. 10. No. 3. pp. 432–435. With 1 fig.

About half the material referred to in the title had already been investigated by Dr. Chacin-Itriago at Lausanne. On his death his widow gave it to the Institute of Hygiene and Parasitology of that University and Professor Galli-Valerio entrusted it to Walter for completion and report. It consists of 1,346 faecal specimens reported on in detail for geographical distribution in 707 and in general in 639 more. The percentages of infection discovered by the unstated method of diagnosis were respectively for these two sets of specimens :— Ascaris 48·8 and 46·5, Trichuris 82·1 and 79·8, "*Ancylostomum duodenale*" 39·6 and 40·7, Ascaris and Trichuris 44·7 and 34·7, Ascaris and "*Ancylostomum*" 17·4 and 20·7, Ascaris, Trichuris and "*Ancylostomum*" 17·3 and 16·3, Taenia 1·55 and 0·9 and in addition there were 3 of *Schistosoma mansoni*, 1 of lamblia, and 1 of a fourfold infection with Ascaris, Trichuris, "*Ancylostomum*" and Taenia. *C. L.*

de Aragão (R. Moniz). Incidencia verminotica na população de João Pessoa. [**Incidence of Worms in João Pessoa.**]—*Brasil-Medico.* 1938. July 23. Vol. 52. No. 30. pp. 679–680.

From 1931 to 1937 the number of stools examined at the Central Laboratory of the Director General of Public Health of the State of Parahyba has been 4,972 with 74·5 per cent. positive for worms; the percentages of infection with different worms for these persons were : Ascaris 51·7, Trichuris 31·2, Enterobius 19·0, Necator 14·8, Schistosoma 2·5. Of 830 persons classified by age the following figures hold. For 90 sucklings examined the infection rates were : total 73, Ascaris 48·8, Trichuris 25·5, Enterobius 7·7, Necator 20, Schistosoma 0; for 495 of pre-school age the percentages were : for all infections 82·8, Ascaris 70·6, Trichuris 27·3, Enterobius 49·2, Necator 7·2, Schistosoma 2·7; for other ages the percentages of infections in 246 examined were : for all infections 77·6, Ascaris 41·0, Trichuris 24·8, Enterobius 10·5, Necator 22·5, Schistosoma 1·8. [It would have been valuable to learn the means of diagnosis which gave such a high percentage of Enterobius infections.] *C. L.*

ANDREWS (Mary N.). **A Survey of Intestinal Parasites in Chinese Hospital Patients in Shanghai.**—*Chinese Med. Jl.* 1938. Oct. Vol. 54. No. 4. pp. 341–350. [10 refs.]

The result of 5,205 faecal examinations of 2,888 patients in Shanghai or 1·8 examinations per person instead of the 3 aimed at. The investigation covered a period of over 5 years. It was routine work in two-thirds of the specimens but in the other third the patients were selected for particular reasons.

For protozoa two films were examined under the oil immersion, one in normal saline, the other in double strength Gram's iodine solution. For helminths, one film was made in normal saline, one specimen was concentrated by hydrochloric acid and ether, and one sedimented by Tomb and Helmy's method [this *Bulletin*, 1932, Vol. 29, p. 410]; while for schistosomes the miracidia were hatched out. The table shows the numbers of positive findings.

Comparison of the different methods used for the detection of helminthic ova.

Parasite	Total number of times found	Number of times found by each method			
		Direct smear	Concentration	Sedimentation	Faust & Meleney
Ascaris ...	218	188	142	142	
Hookworm ...	259	132	259	158	
Trichuris ...	375	165	364	178	
Fasciolopsis	26	13	13	24	
Clonorchis ...	15	7	14	9	
Schistosoma	354	67	82	172	325

The apparently favourable findings of Ascaris ova by direct smear are illusory, for fertile eggs were more readily found by concentration and unfertile eggs by sedimentation and the combined positive results these gave exceeded those got by smear. In 107 cases adult hookworms were recovered, *A. duodenale* in 80, *N. americanus* in 51 and both in 24. The high number of schistosome infections is due to faeces being sent for examination in nearly all suspected cases. Taenia eggs were found in 6, those of *H. nana* in 1, of Enterobius in 9, Clonorchis in 67, Fasciolopsis in 60, Paragonimus in 1 and Heterophyes in 1. For protozoa the corresponding figures were: *E. histolytica* 126, *E. coli* 314, *E. nana* 239, *I. bütschlii* 53, *G. lamblia* 144, *C. mesnili* 17, *Trichomonas hominis* 75, Tricercomonas 8, *Isospora hominis* 1. The percentage in which protozoa were discovered is 24, that for helminths 61. *C. L.*

NARIHARA (Norio), YUMOTO (Yoshika), OSAKA (Kiyoshi) & MAEDA (Toshinori). **Intestinal Parasitic Infections of Japanese and Formosan Chinese School Children in Taihoku City.**—*Taiwan Igakkai Zasshi* (*Jl. Med. Assoc. Formosa*). 1938. Oct. Vol. 37. No. 10 (403). [In Japanese pp. 1581–1604. [45 refs.] English summary pp. 1605–1606.]

Diagnosis was by examination of 6 smears from one stool passed by each person, 971 Japanese and 1,363 Formosan Chinese.

The material was concentrated by breaking up a few grams of faeces in about 10 cc. of normal saline, centrifuging, decanting, and apparently repeating this process several times. A portion of the fine sediment thus obtained was examined in 6 smears, 3 for helminths and 3 for protozoa. The Donaldson's eosin-iodine solution was also used for the identification of protozoan cysts. The percentage rates of infection found were, for Japanese and for Formosan Chinese respectively: hookworm 1, 2·2; Ascaris 22·25, 53·56; Trichuris 22·14, 37·78; Enterobius 1·65, 1·54; Paragonimus 0·1, 0·15; Metagonimus 0·21, 0; *H. diminuta* 0·1, 0; *H. nana* 0, 0·07; *E. histolytica* 1·24, 5·5; *E. coli* 3·39, 8·29; *E. nana* 4·33, 12·18; *I. bütschlii* 0·31, 0·81; *G. lamblia* 10·5, 15·62; *T. hominis* 0, 0·44.

"The results of this examination showed that the frequency of intestinal helminthic and protozoan infections of Formosan Chinese was much higher than that of Japanese, but much less than that of Yokogawa and Wakeshima's conclusion reported for several years ago. It demonstrates that the sanitary conditions of Formosan Chinese have been improved over these several years."

C. L.

Hsü (H. F.). **Studies on the Food and the Digestive System of Certain Parasites. II. On the Food of** *Schistosoma japonicum*, *Paragonimus ringeri*, *Dirofilaria immitis*, *Spirocerca sanguinolenta* **and** *Rhabdias* **sp.**—Reprinted from *Bull. Fan. Mem. Inst. Biol.*, Zool. Ser. 1938. Oct. 20. Vol. 8. No. 4. pp. 347–366. With 32 figs. (6 coloured) on 15 plates.

BACILLARY DYSENTERY AND INTESTINAL PROTOZOAL INFECTIONS.*

Précis of Abstracts in this Section.

Lippelt (p. 596) found Targesin, a complex colloidal preparation of silver, to have a marked inhibitory action on cultures of the Shiga-Kruse, Flexner and Sonne strains of *Bact. dysenteriae*. It is well tolerated by animals and in a clinical trial on four patients with dysentery it gave good results.

Dobell (p. 597) describes the life history of *Entamoeba coli*, and the process of excystation. The large "trophic" amoebae reproduce by binary fission without any evidence of a sexual process such as has been described. He discusses nomenclature and decides that *Entamoeba coli* is the correct name. Tyzzer and Geiman (p. 598) found that *E. coli* in a patient had ingested red blood cells. Careful examination showed that they were not *E. histolytica*.

Boughton and Byrd (p. 598) found that mixed intestinal protozoal infections occur too frequently to be accounted for by mere chance, whereas mixed flagellate infections do not. Sangiorgi (p. 598), Kessel and Sinitsin (p. 599) and Kourí *et al.* (p. 599) report on surveys of intestinal protozoa.

Mackenzie and Bean (p. 599) cured by means of methylene blue in an enema, a patient with diarrhoea due to *Balantidium coli*.

* For amoebic dysentery see this *Bulletin*, 1939, Vol. 36, pp. 281–305.

DE PAULA E SILVA (p. 599) reports cure of 9 patients by the giving of a strict milk diet, and of another by the administration of paroxyl. HSIUNG (p. 600) shows that *Balantidium coli* and *B. suis* occur in the pig, and FÜSTHY (p. 600) found that almost all the pigs in a district in Hungary were infected by one or the other.

In Buenos Aires, BACIGALUPO (p. 600) states that Iodamoeba infection occurs in 26·67 per cent. of pigs and in 1 to 2 per cent. in man, but apparently the Iodamoebae are distinct and pigs do not infect man. MOLLARI and AUZULOVIC (p. 600) report cure of a patient infected with *D. fragilis* by emetine and treparsol.

CICCHITTO (p. 601) describes abnormal forms of *C. mesnili*, and CIFERRI and REDAELLI (p. 601) discuss the systematic position of Blastocystis.

Giardia infections—NARIHARA (p. 601) has estimated the survival time of lamblia cysts subjected to the action of various reagents.

PONTONI (p. 601) reports a case of enteritis in which *E. histolytica* and *G. lamblia* were found. FOURNIER (p. 602) quotes two cases in which lamblia were found by duodenal tubage. They were not responsible for the symptoms of the patients, however, since one was a case of schistosomiasis and the other of chronic appendicitis. DESCHIENS (p. 602) holds that lamblia may be harmless commensals or definitely pathogenic, but that the finding of lamblia in bile obtained by duodenal tubage is no proof that the bile passages are infected.

Treatment by salvarsan is advocated by BREUER (p. 603), DE PAULA E SILVA (p. 603) and v. FRIEDRICH (p. 603) who all obtained good results. LEITE (p. 603) uses entero-vioform orally with success.

The remainder of the papers report on the treatment of Giardia infection with atebrin (or quinacrine, which is the same thing). All agree that it is most efficient in curing the condition quickly. The usual doses (of about 0·3 mgm. daily for 5 days) are advised and the flagellates often disappear after a few tablets. FALLA ALVAREZ *et al.* (p. 605) consider that as various gastro-duodenal and nervous symptoms disappear following atebrin treatment, there can be no doubt that lamblia are pathogenic. *C. Wilcocks.*

LIPPELT (Heinrich). Ruhrbacillen und Targesin. [**Dysentery Bacilli and Targesin.**]—*Klin. Woch.* 1938. Apr. 30. Vol. 17. No. 18. pp. 636–637. [11 refs.]

There exists considerable doubt regarding the use of serum therapy in bacillary dysentery so that an efficient intestinal disinfectant becomes very desirable. Such a substance should fulfil two purposes :—

1. It should act upon the actual micro-organism of the disease.
2. It should in no way damage the tissues of the patient.

Targesin is a complex colloidal combination of albumin with the diacetyl-tannic acid silver salt. It is found to have no appreciable action upon the mucous membrane of animals and is well tolerated when administered by the mouth. It appears to be a suitable substance for bacillary dysentery. Favourable results have been recorded in the treatment of stomach and intestinal disorders. Albuminate of silver and diacetyl-tannin have both been used in intestinal therapy. A combination of these two substances is particularly well tolerated, whilst their antispasmodic and antidiarrhoeic characters are specially valuable for the treatment of dysentery.

Experiments were made on cultures of Shiga, Flexner and Sonne, as well as members of the typhoid and Proteus groups. In a dilution of 1 : 10,000 it exerted a lethal action within five minutes. Experiments were conducted both at room temperature and at 37°C. in the incubator.

The inhibitory effect of Targesin was especially marked in the case of the Shiga-Kruse, Flexner and Sonne strains. The conclusion arrived at is that the substance is specially suitable for the treatment of bacillary dysentery, and bears out the reputation Targesin has already acquired in gonococcal infections.

In man a therapeutic trial has been made in four dysentery cases (Y and Sonne), given in doses of two tablets by mouth three times daily with favourable results. A carrier of the infection was also successfully cleared of organisms. *P. H. Manson-Bahr.*

Castellanos (Agustín). Entero-colitis sanguinolentas. Estudio general. [**Haemorrhagic Entero-Colitis.**]—*Vida Nueva.* 1939. Jan. 15. Vol. 43. No. 1. pp. 1–95. With 18 figs. on 8 plates.

Dobell (Clifford). **Researches on the Intestinal Protozoa of Monkeys and Man. IX. The Life-History of *Entamoeba coli*, with Special Reference to Metacystic Development.**—*Parasitology.* 1938. June. Vol. 30. No. 2. pp. 195–238. With 61 figs. on 3 plates. [34 refs.]

In this paper the author describes with his accustomed care the life history of *Entamoeba coli*, based on the cultural study of strains isolated from the marmoset, species of *Macacus* and man, and the experimental transfer from one to another of these hosts. It is noted that, as regards the encysted stages, the nucleus with its coarser chromatin and eccentric karyosome is the chief feature distinguishing *E. coli* from corresponding stages of *E. histolytica*. As is well known, the mature cyst contains eight nuclei, but before excystation the enclosed amoebae frequently lose some of the nuclei, to the number of one to four. Excystation is brought about by the retraction of the cytoplasm from the double wall of the cyst, the formation of pseudopodia which " stroke " the wall till finally a considerable tear is made, and the escape through the rupture of the multinucleated amoeba which, without any nuclear divisions such as occur in the escaped amoeba of *E. histolytica*, ultimately divides into uninucleated amoebulae. It will be recalled that the four-nucleated amoeba of *E. histolytica* escapes from its cyst through a small pore. The uninucleated amoebulae grow into the large " trophic " amoebae which reproduce by binary fission. At no stage in the development was there any indication of a sexual process such as has been described by certain observers.

The paper is illustrated by 61 figures in black and white arranged in three plates. On the excellence of these and on the lucidity with which every detail of the life cycle is discussed and described it is unnecessary to comment, as the high standard of the author's publications is familiar to all his readers.

At the end of the paper, in a Memorandum on the Genus *Entamoeba*, Opinion 99 of the International Commission on Zoological Nomenclature is seriously questioned. By the decision of the Commission it is laid down that *Entamoeba* is a synonym of *Endamoeba*, which was a genus founded by Leidy for an amoeba of the cockroach. It is

argued that by this decision both *E. coli* and *E. histolytica* are referred to the genus *Endamoeba*, an impossible position, as no one has ever attempted to prove that the two human amoebae belong to the same genus as the amoeba of the cockroach. In arriving at their decision the Commission is shown to have gone " beyond their competence," so that if Opinion 99 is accepted some other generic name will have to be found for the human amoebae. The author's conclusion is that those who write *Entamoeba coli* can do so with a clear conscience, as Truth and Reason and even the International Code are on their side. *C. M. Wenyon.*

Tyzzer (Ernest E.) & Geiman (Quentin M.). **The Ingestion of Red Blood Cells by *Endamoeba coli* and its Significance in Diagnosis.**—*Amer. Jl. Hyg.* 1938. Sept. Vol. 28. No. 2. pp. 271–287. With 36 figs. on 2 plates. [22 refs.]

In a case of intestinal obstruction due to a papillomatous polyp of the sigmoid a blood-streaked mucous discharge was observed and in it were seen numerous amoebae with included red blood cells. A careful study of the amoebae, including culture and inoculation of kittens, failed to provide any evidence of the existence of *Entamoeba histolytica*. Everything pointed to the amoeba being *E. coli*, so that it became evident that this was a case in which *E. coli* was actively ingesting red blood corpuscles in the intestine. It is pointed out that if the presence of red blood corpuscles in the amoebae had been accepted without any further evidence as sufficient for the diagnosis of an *E. histolytica* infection a mistake would have been made which might have condemned the patient to an unnecessary and costly course of treatment.

The paper is illustrated by three dozen microphotographs showing the characters of the amoebae and their cysts. They leave no doubt as to the correctness of the conclusions drawn. *C. M. W.*

Rosenfeld (Gastão). O valor semeiologico da ameba coli. [**The Significance of *E. coli*.**]—*Arch. Uruguayos de Med., Cirug. y Especialidades.* 1938. Feb. Vol. 12. No. 2. pp. 157–159.

Boughton (Donald C.) & Byrd (Elon E.). **On the Incidence of Mixed Infections with Intestinal Protozoa.**—*Amer. Jl. Hyg.* 1938. Jan. Vol. 27. No. 1. pp. 88–94.

It is well known that in surveys of groups of people for intestinal protozoa a number of mixed infections always occur. By a statistical analysis of the results of two such surveys the authors have shown that the occurrence of mixed amoebic infections is too frequent to be accounted for by mere chance. The same remark applies, but less definitely, to mixed amoebic and flagellate infections, whereas mixed flagellate infections occur only as frequently as can be expected from a chance distribution. *C. M. W.*

Sangiorgi (G.). Forme rare di protozoi intestinali nelle Puglie. [**Rare Intestinal Protozoa in Puglie.**]—*Pathologica.* 1938. Oct. 15. Vol. 30. No. 564. pp. 421–422. [13 refs.] English summary (5 lines).

In examinations of stools carried out in Puglie, Italy, the author has met with the following intestinal protozoa—*Endolimax nana*, *Iodamoeba bütschlii*, *Dientamoeba fragilis*, *Pentatrichomonas intestinalis* and *Isospora bigemina*. *C. M. W.*

KESSEL (John F.) & SINITSIN (D.). **A Survey of Intestinal Protozoa among Children and Adults in Los Angeles.**—*Jl. Parasitology.* 1938. Oct. Vol. 24. No. 5. pp. 433–436.

The survey was based on the examination of 585 adults seeking work as kitchen employees in the Los Angeles County Hospital, 753 adult clinic patients seeking medical attention for conditions other than gastro-intestinal in nature and 678 children from a Los Angeles City Juvenile Detention Home. In the first group six consecutive daily stools were examined while in the other two groups only a single one following a saline purge was examined. The findings are given in a table which separates the males from the females. The results resemble other similar surveys but show various minor variations, which the authors indicate in their text. Of 2,016 persons examined 33·7 per cent. showed positive results. *E. histolytica* was found in 3·3 per cent., *E. nana* in 11·0, *D. fragilis* in 1·7, and *Giardia* in 4·8 per cent. *C. M. W.*

KOURÍ (Pedro), BASNUEVO (José G.), SOTOLONGO (Federico) & ANIDO (Vicente). Las protozoosis intestinales en la ciudad de la Habana. [**Incidence of Intestinal Protozoa in Havana.**]—*Rev. Med. Trop. y Parasit.* Habana. 1938. Sept.–Oct. Vol. 4. No. 5. pp. 271–273.

The paper gives the results of the examination in Havana of 8,143, samples of human faeces for intestinal protozoa. All the forms were discovered and these were present in the usual proportions.

C. M. W.

MACKENZIE (D. L.) & BEAN (H.). **Balantidial Dysentery.**—*Lancet.* 1938. Jan 8. pp. 84–85. With 2 figs.

About six months after admission to the County Mental Hospital, Rainhill, a female patient 31 years of age was found to be suffering from diarrhoea due to *Balantidium coli* infection. In attempts to stain the living ciliates with Löffler's methylene blue it was observed under the microscope that as they took up the stain their movements ceased. Accordingly the case was treated by running into the large intestine two pints of the stain, after the colon had been washed out. The treatment was repeated the next day. Free ciliates were no longer found but gradually diminishing numbers of cysts were passed for a fortnight, when the treatment was repeated. No further ciliates or cysts could be detected. The source of the infection could not be traced, there having been no association with pigs. The statement made by the authors that infection may occur through eating diseased flesh is incorrect. *C. M. W.*

DE PAULA E SILVA (Geraldo Siffert). Balantidiase humana : aspectos clinicos e therapeuticos. [**Balantidial Infection.**]—*Brasil-Medico.* 1938. Nov. 5. Vol. 52. No. 45. pp. 1005–1015. With 2 charts. [31 refs.] English summary.

Two cases of balantidiosis are detailed and the author refers to eight others in which, after the usual forms of treatment by yatren, emetin, etc., had proved unavailing, the giving of a strict milk diet, 350 cc. six times a day, was followed soon in all but one by

disappearance of the parasite and of the clinical signs. In the exception there was clinical improvement, though the protozoon could still be seen on faecal examination. To this patient paroxyl (4-oxy-3-acetylaminophenylarsinic acid) was given; the diarrhoea ceased and the Balantidia could no longer be seen. *H. H. S.*

Hsiung (Tsuen). Biometrische Untersuchungen an den Balantidien des Schweines in der Kultur. [**Biometric Studies on Pig Balantidia in Culture.**]—*Ztschr. f. Parasitenk.* 1938. Apr. 2. Vol. 10. No. 1. pp. 108–131. With 3 figs. [29 refs.]

Biometric studies on various races of Balantidia from pigs have shown that McDonald's contention made in 1922 that two species of the ciliate occur in these animals is correct. These are *Balantidium coli* and *B. suis*, the former being of larger average dimensions than the latter. *C. M. W.*

Füsthy (Ö.). Untersuchungen ueber das Vorkommen der Balantidiosis in Ungarn. [**Incidence of Balantidial Infection in Hungary.**]—*Zent. f. Bakt.* I. Abt. Orig. 1938. Aug. 18. Vol. 142. No. 3/4. pp. 133–137.

Working in Hungary, the author has found that practically every pig in the district examined is infected with Balantidium, of which two species, *Bal. coli* and *Bal. suis*, are present. An examination of 160 persons revealed an infection in only one individual 65 years of age. This infection, which gave rise to no symptoms, was undoubtedly acquired through contact with pigs. *C. M. W.*

Bacigalupo (Juan). Algunas consideraciones sobre la *Iodamoeba butschlii*. [**Notes on** *Iodamoeba bütschlii.*]—*Rev. Med. Trop. y Parasit.* Habana. 1938. May–June. Vol. 4. No. 3. pp. 141–146. With 2 figs. on 1 plate.

It is found that Iodamoeba infection occurs in 26·67 per cent. of pigs in Buenos Aires. It is evidently a common infection in these animals as it has been found in all countries in which it has been looked for. As regards human beings in Buenos Aires the Iodamoeba infection rate varies from 1 to 2 per cent. There is no relation between infection and occupation, certain individuals who have tended pigs for 20 years being free from infection. Attempts to infect pigs with cysts of human origin failed, though success was obtained with cysts from infected pigs. It seems that though the human and pig Iodamoeba are identical morphologically they are actually distinct, so that pigs play no part in the spread of the human infection. *C. M. W.*

Mollari (Mario) & Anzulovic (J. V.). **Cultivation and Pathogenicity of** *Diendamoeba fragilis*, **with a Case Report.**—*Jl. Trop. Med. & Hyg.* 1938. Aug. 1. Vol. 41. No. 15. pp. 246–247.

From the stools of a case of repeated intestinal haemorrhage associated with thickening in the right iliac region an amoeba identified as *Dientamoeba fragilis* was cultivated. It was maintained for 180 sub-cultures. In stained films only uninucleate amoebae were seen. The patient, who had been ill for a long time, was treated with emetine

hydrochloride and treparsol for four days. A week later the course was repeated. The result was an immediate improvement followed by disappearance of the infection and return to good health. *C. M. W.*

Cicchitto (Angelo M.). Su alcune alterazioni morfologiche del *Chilomastix mesnili*. [**Morphological Changes in *Chilomastix mesnili*.**]—*Ann. d'Igiene*. 1938. Sept.–Oct. Vol. 48. No. 9–10. pp. 548–554. [14 refs.]

The author describes an infection due to *Chilomastix mesnili* and notes that the flagellates are often of an abnormal or amoeboid form. He considers the possibility of the flagellate being a new species but very wisely concludes that it is actually *C. mesnili*. As a matter of fact the forms described by the author are of very common occurrence and are well known as deformed specimens to those who have experience of the flagellate. A plate in black and white illustrates the various types referred to. *C. M. W.*

Ciferri (R.) & Redaelli (P.). **A New Hypothesis on the Nature of Blastocystis.**—*Mycopathologia*. The Hague. 1938. May 9. Vol. 1. No. 1. pp. 3–6. [34 refs.]

This is a discussion of the systematic position of *Blastocystis*, which everyone nowadays regards as a vegetable organism of a fungoid nature. The authors conclude that it has affinities with the unicellular achloric Autosporineae amongst the algae and they propose including them in the family Protothecaceae Printz amongst the Oöcystaceae.

C. M. W.

Chodzko. (W.) Lambliase en Pologne. [**Giardia Infection in Poland.**]—*Bull. Office Internat. d'Hyg. Publique*. 1939. Mar. Vol. 31. No. 3. pp. 456–470. With 3 figs. on 2 plates. [32 refs.]

Narihara (Norio). **Resistance Tests of the Cysts of *Giardia lamblia*.**—*Taiwan Igakkai Zasshi. (Jl. Med. Assoc. Formosa)*. 1938. May. Vol. 37. No. 5 (398). [In Japanese pp. 823–836. [34 refs.] English summary pp. 836–837.]

By use of the eosin test, which is based on the assumption that live cysts do not stain when brought into a solution of the dye, the author has determined the survival time of lamblia cysts when subjected to the action of a number of reagents, such as mercuric chloride, alcohol, carbolic acid, calcium hypochlorite, etc., of varying concentration.

C. M. Wenyon.

Pontoni (L.). Dictosarcomatosi (reticolosarcomatosi) regionalizzata e tubercolosi delle linfoghiandole mesenteriche in lamblio-amebiasico. [**Generalized Reticulosarcoma and Tuberculosis of Lymphatic Glands associated with Giardial and Amoebic Infection.**] —*Pathologica*. 1937. Oct. 15. Vol. 29. No. 552. pp. 415–424. With 6 figs. on 2 plates. [35 refs.] English summary (5 lines).

The paper describes a complicated case of enteritis associated with enlargement of the mesenteric glands and infection with *Entamoeba*

histolytica and *Giardia lamblia*. At autopsy a follicular enteritis was discovered, while microscopical examination of the glands revealed both tubercular and malignant changes. The relationship of the pathological condition to the protozoal infections is discussed.

C. M. W.

FOURNIER (J.). A propos des manifestations extra-intestinales de la lambliose. [**Extra-intestinal Manifestations of Giardia Infections.**] —*Bull. Soc. Path. Exot.* 1938. Oct. 12. Vol. 31. No. 8. pp. 716–720.

The author comments on the modern tendency of many physicians to attribute all manner of symptoms to the presence of lamblia in the intestine. The procedure of duodenal tubage, which is practised with increasing frequency, is bringing to light many infections which otherwise would have remained undetected, while the presence of flagellates in the bile withdrawn from the duodenum is regarded as sufficient evidence of the invasion of the biliary passages and gall bladder by the flagellates. It is pointed out that there is little justification for this last conclusion. Without denying any pathogenic properties to the lamblia under certain conditions, the author quotes two cases which are most instructive in this connexion.

The first case, from Shanghai, was that of a child 8 years of age suffering from hypertrophic cirrhosis of the liver, splenomegaly and ascites. All the usual investigations gave no clue to the cause of the condition till duodenal tubage revealed an enormous lamblia infection. The local medical men were inclined to see in this infection the cause of the trouble. Further faecal examinations were made, and finally eggs of *Schistosoma japonicum* were found and the diagnosis established.

The second case was that of a French soldier in Shanghai who suffered from attacks of pain in the right hypochondrium. The pain extended over the abdomen, while the liver was abnormally sensitive. In this case examination of the stools revealed only lamblia cysts, while by duodenal tubage enormous numbers of the flagellates were shown to be present in the duodenum. Various treatments were tried to rid the patient of his lamblia infection but without result. Finally administration of quinacrine (atebrin) proved successful and the flagellate infection was eradicated. The symptoms, however, persisting, surgical interference was advised. There was thus discovered a chronically diseased appendix which was retrocaecal in position and situated high up in the abdomen.

In both these cases there had been an inclination to attribute the symptoms to a lamblia infection and in both it was possible to discover the cause to be quite of another nature.

In a discussion following the presentation of the author's paper M. R. DESCHIENS emphasizes the author's point of view and notes that, as in other intestinal protozoal infections, the lamblia may be present as harmless commensals on some occasions while on others they may be definitely pathogenic. He agrees that their presence in bile obtained by duodenal tubage is not proof of invasion of the bile ducts or gall bladder. *C. M. W.*

Breuer (Anneliese). Die Symptomatologie und die Behandlung der Lamblien-Infektion des Menschen. [**Symptomatology and Treatment of Giardia Infection in Man.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1938. May. Vol. 42. No. 5. pp. 201–222. With 3 figs. [93 refs.]

This is a long paper based on 104 cases of lamblia infection studied at the tropical convalescent home at Tübingen from 1929–1937. An extensive literature of the subject is reviewed and a long list of references given. Of the cases treated 26 became free of infection while 38, though cured clinically, still harboured the flagellate. From the point of view of treatment the best results were obtained with arsenicals—spirocid or salvarsan. In some cases it was difficult to gauge the pathogenicity of the flagellate, which occurred in 20 per cent. of the cases without any symptoms and in 50 per cent. in association with amoebae. *C. M. W.*

de Paula e Silva (Geraldo Siffert). Novos estudos sobre a giardiase. [**New Studies on Giardia Infections.**]—*Brasil-Medico.* 1938. Jan. 15. Vol. 52. No. 3. pp. 67–73. [11 refs.]

The author, who considers that *Giardia lamblia* is pathogenic and parasitizes not only the duodenum but also the biliary passages, describes the symptoms which he attributes to this flagellate infection and the successful treatment of thirty-three cases by injections of full doses of neosalvarsan followed by the oral administration of stovarsol and in some cases yatren. *C. M. W.*

v. Friedrich (L.). Die pathogenetische Bedeutung der *Lamblia intestinalis*. [**Pathogenic Importance of** *Giardia lamblia*.]—*Klin. Woch.* 1938. Apr. 23. Vol. 17. No. 17. pp. 605–608.

This is a long discussion on the pathogenicity of *Giardia lamblia* from which it is concluded that every sick person found to be harbouring the flagellate must be energetically treated. There is no certain cure for the condition, the best results being obtained by intraduodenal introduction of salvarsan and duodenal lavage. *C. M. W.*

Leite (Moacyr Renault). Tratamento da cholecystite de origem lambliatica. [**Treatment of Cholecystitis due to Giardia Infection.**]—*Folha Med.* 1937. May 15. Vol. 18. No. 14. pp. 220–222.

The author assumes that certain cases of cholecystitis are due to lamblia infections, as proved, in his opinion, by the discovery of flagellates in material collected by duodenal tubage. To treat the condition he has employed entero-vioform (iodo-chlor-oxyquinolin) orally. Three tablets (each containing 0·25 gram) are given daily. Successful results are reported. *C. M. W.*

Galli-Valerio (B.). La lambliase et son traitement par l'atébrine. [**Atebrin Treatment of Giardia Infections.**]—*Schweiz. Med. Woch.* 1937. Dec. 11. Vol. 67. No. 50. pp. 1181–1182. [19 refs.]

The author believes that the good results he has obtained in the treatment of lamblia infections by oral administration of atebrin have completely solved the difficult problem of the chemotherapy of this condition. *C. M. W.*

MARTIN (Pierre). Le traitement de la lambliase par la quinacrine. Résultats d'une expérience de près de deux années. [**Quinacrine Treatment of Giardia Infections.**]—*Rev. Méd. et Hyg. Trop.* 1938. Jan.–Feb. Vol. 30. No. 1. pp. 32–39.

Since GALLI VALERIO first announced the successful treatment of lamblia infections with atebrin a number of observers have reported favourably on the action of the drug. In the present paper the author reviews the literature on the subject and gives an account of his own experience of the use of quinacrine, the French equivalent of atebrin. He reports that the drug, orally administered, rids patients of both lamblia and trichomonas infections and that when given in solution as a vaginal douche it is active against *Trichomonas vaginalis*.

C. M. W.

TANGUY (Y.). Traitement de la lambliase par la quinacrine. [**Treatment of Giardia Infection with Quinacrine.**]—*Bull. Soc. Path. Exot.* 1937. Oct. 13. Vol. 30. No. 8. pp. 693–694.

The author writes in favour of quinacrine as a remedy against lamblia infection. The treatment consists in taking by the mouth three times a day at meal times for five days a tablet of 0·1 gram of the drug. After a rest of five days the course is repeated. This is done a third or even a fourth time if necessary. The statement is made that the drug is as active against the cysts as against the free forms, a remark which seems to imply that the cysts and free forms represent separate infections. It would be equally logical to state that in an ankylostome infection a drug was active against the eggs as well as against the worms. In all such cases a drug which destroys the free forms will lead automatically to disappearance of cysts or eggs, since there are no longer any free forms to produce them. *C. M. W.*

HEILMANN (Karl). Die Behandlung der Lambliosis mit Atebrin. [**Treatment of Giardia Infections with Atebrin.**]—*Muench. Med. Woch.* 1938. Oct. 21. Vol. 85. No. 42. pp. 1626–1628. [14 refs.]

The author has successfully treated a series of thirteen cases of lamblia infection by oral administration of atebrin. Relatively small doses such as 0·1 to 0·2 gm. three times a day for three days are usually sufficient to get rid of the flagellates. The results are superior to those obtained by intravenous injections of neosalvarsan, which was also tried in a series of cases. *C. M. W.*

GRÜNEIS (Paul). Zur Therapie der Lambliosis. [**Therapy of Giardia Infections.**]—*Wien. Klin. Woch.* 1938. June 3. Vol. 51. No. 22. pp. 605–606. [13 refs.]

The author writes in favour of the atebrin treatment of lamblia infections, which is not only easy to carry out and free from danger but also certain in its results. *C. M. W.*

PORGES (O.). Zur Symptomatologie und Therapie der Lambliasis. [**Symptomatology and Therapy of Giardia Infections.**]—*Med. Klin.* 1938. Apr. 29. Vol. 34. No. 17 (1740). pp. 580–582.

For the treatment of lamblia infections, which are discussed at length in the paper, the author advocates a five-day course of atebrin,

followed by a daily dose for a month of dermatol (bismuth subgallate) and a six months régime of food which is poor in cellulose and the avoidance, when symptoms referable to gall bladder trouble are present, of all highly seasoned and irritating food and drink.

C. M. W.

Romano (Nicolas), Rey (Simon) & Meiller (Enrique). Giardiasis intestinal, formas clínicas y tratamiento. [**Treatment of Giardia Infections.**]—*Prensa Méd. Argentina.* 1938. Sept. 14. Vol. 25. No. 37. pp. 1725–1730. [44 refs.]

In a series of 800 cases in which duodenal tubage was practised, lamblia infection was detected in 80. It is concluded that the flagellate is definitely pathogenic but that if it ever invades the biliary passages it does so only exceptionally. As regards various treatments that have been tried, these were far from satisfactory till atebrin was employed. In the first case a remarkable result was obtained and this was followed by the successful treatment of twenty further cases. Atebrin thus affords an easy and ready means of destroying the flagellates which often disappear after the first dose of two tablets of the drug. *C. M. W.*

Bacigalupo (Juan). Algunas consideraciones sobre giardiasis y su tratamiento. [**Giardia Infection and its Treatment.**]—*Arch. Argentinos Enferm. Aparato Digest. y Nutric.* Buenos Aires. 1937. Oct.–Nov. Vol. 13. No. 1. pp. 5–16. [16 refs.]

The paper describes the treatment of a number of cases of lamblia infection by the oral administration of atebrin. It is claimed that the drug is extraordinarily efficacious in eradicating infections with this flagellate. *C. M. W.*

Falla Alvarez (Laureano), Silveira (Rafael) & Bernardino (Santiago). El tratamiento de la lambliasis por la atebrina. Consideraciones clinicas y terapeuticas. [**Atebrin Treatment in Giardia Infections.**]—*Vida Nueva.* 1938. May 15. Vol. 41. No. 5. pp. 320–330. [19 refs.] English summary.

The authors point out that various gastro-duodenal and nervous symptoms are attributable to lamblia infections for which hitherto no specific remedy was available. The loss of the infection, and with it the disappearance of symptoms, following atebrin treatment would appear to settle once for all any doubts which exist regarding the pathogenicity of these flagellates. *C. M. W.*

Kourí (Pedro), Basnuevo (José G.), Sotolongo (Federico) & Anido (Vicente). Tratamiento de la lambliasis por las sales de acridina. [**Atebrin Treatment of Giardia Infections.**]—*Rev. Méd. Trop. y Parasit.* Habana. 1938. Sept.–Oct. Vol. 4. No. 5. pp. 279–283.

It is noted that infections due to lamblia are very common in Cuba. Twenty-three cases were treated and all were cured by the use of atebrin. *C. M. W.*

BACIGALUPO (Juan). Tratamiento de la giardiasis. [**Treatment of Giardia Infection.**]—*Rev. Med. Trop. y Parasit.* Habana. 1938. Sept.–Oct. Vol. 4. No. 5. pp. 285–298. [16 refs.]

The paper gives notes of 25 cases of lamblia infection which were cured by oral administration of atebrin. *C. M. W.*

REVIEWS AND NOTICES.

ROGERS (Leonard) [K.C.S.I., C.I.E., LL.D., M.D., B.S., F.R.C.P., F.R.C.S., F.R.S., etc.] & MEGAW (John W. D.) [K.C.I.E., B.A., M.B., Hon.D.Sc. (Queen's University, Belfast), etc.] **Tropical Medicine.** Third Edition.—pp. xii+544. With 2 coloured plates & 87 text figs. 1939. London: J. & A. Churchill, Ltd., 104 Gloucester Place, Portman Square. [16*s.*]

The third edition of this standard text-book maintains the same order as previous editions. Certain diseases, in the order of their exposition, are classified rather on account of the symptoms and signs they produce than on account of the aetiological agents. Thus amoebic hepatitis is included with malaria, kala azar and trypanosomiasis in the section on febrile diseases caused by protozoa, but amoebic dysentery is in the section of bowel diseases with symptoms of dysentery and diarrhoea, and oriental sore is in the section dealing with diseases with the most prominent lesions on the surface of the body.

The historical introductions to the diseases have been retained and give the student an idea of the immense progress in the understanding of tropical disease which has taken place in the last half century. Although the number of pages is about the same as in the second edition, a considerable amount of new material has been added, permitted partly by excision and partly by an increase in the letterpress on each page, though the type is unchanged.

Much recent work is mentioned, for instance the sulphanilamide treatment of undulant fever, the treatment of plague with human convalescent serum, and the nicotinic acid treatment of pellagra. Justice is done to recent work on the complex bacteriological problem of cholera, the use of vaccines of living avirulent plague bacilli in Java and Madagascar is mentioned, and the modern conceptions of yellow fever and jungle yellow fever are set out. Crowden's work on the heat insulation of buildings is referred to. The treatment of malarial splenomegaly by adrenalin after the manner of Ascoli is not mentioned however, nor is Henry's melanoflocculation test for that disease, though it is referred to in kala azar. The section on diseases caused by venomous animals is, as before, confined to snakes.

The classification of the typhus group of fevers according to the vectors has been retained and is undoubtedly the most useful, and a brief account of trench fever, not as a member of this group, but as a disease regarded as caused by a Rickettsia body, has been added. Dengue and sandfly fever are again classed as mosquito dengue and sandfly dengue, which makes for clarity. A fuller list of vitamin-containing foodstuffs is given.

The useful sections on general diseases in the tropics are retained and serve to remind students that their interest should not be centred

too exclusively on tropical diseases *sensu stricto*. This is especially so in the case of tuberculosis, which is becoming more and more of a problem throughout the hot countries of the world.

The sections on the use of the microscope and on case taking are again included, and throughout the diagrammatic representations of the phases of diseases introduced into previous editions are continued.

The book is more than a text-book, it is a work of reference which will be valuable to any practitioner in the tropics, as the rapid exhaustion of the second edition shows, and it possesses a distinction arising from the fact that the authors, who have already assumed their place in the history of British tropical medicine, write with the first-hand knowledge acquired during many years of practical experience and enquiry. *C. W.*

SHATTUCK (George Cheever) [Harvard School of Public Health] with the collaboration of Joseph C. BEQUAERT, Jack H. SANDGROUND, Margaret M. HILFERTY & Samuel Drury CLARK. **A Medical Survey of the Republic of Guatemala.**—pp. xi+253. With 76 tables, 5 graphs, 2 plates (maps) & 1 fig. 1938. Washington: Carnegie Institution of Washington.

This medical survey organized and directed by the Department of Tropical Medicine of the Harvard School of Public Health was carried out in 1932 under the auspices of the Carnegie Institution of Washington. It is, as may be surmised, a well-documented survey containing no less than 76 tables and will doubtless be for many years the chief source of information for English readers on medical matters in Guatemala.

The population of Guatemala, estimated at 2¼ millions, consists as to 65 per cent. of Indians and 35 per cent. of Spanish-Indians, called ladinos or Latins.

Dr. Shattuck writes on the infectious diseases, including malaria, leishmaniasis, syphilis and yaws and other topics, such as anaemia in the highlands, goitre, pulse rates and blood pressures.

Dr. Hilferty deals with statistics, Dr. Sandground with helminthic infections, Dr. Bequaert with arthropods and the distribution of Phlebotomus in South and Central America. Dr. Clark has a short chapter on the diseases of the Peten District. Latins have higher birth-rates and death-rates than Indians but this may be due to better reporting.

As to the history and probable origin of the infectious diseases of Guatemala, yellow fever was first recorded in 1859, and the last epidemic was in 1924; tests show the presence of resistant individuals. Cholera has not been seen since 1857 and plague has never been established. Shattuck believes that nearly all the more deadly epidemic diseases known in the New World since its discovery by Columbus have been imported from the Old World within historic times.

A study of 812 patients examined in the highlands is tabulated: it includes 29 pellagrins. The study was designed to throw light on the prevalence of syphilis, of which 28 cases were recognized. The chief problem of the Peten District is the prevalence of chiclero ulcer, a form of leishmaniasis acquired by the gatherers of the basic material of chewing gum. Malaria is a major sanitary problem: *A. albimanus* is the most dangerous vector. Leishmaniasis in America is fully

discussed. The presence of autochthonous cases was not recognized with certainty till 1909 when the causal organisms were found. There is a close correlation between its distribution and that of species of Phlebotomus which bite man. No case of visceral leishmaniasis has been found. Syphilis is treated at some length. A positive diagnosis was made in twice as many Latins as Indians and the proportion of complete clinical latency was high in both races. Dr. Shattuck did not encounter yaws, but it has been reported.

In regard to the helminthic infection of Guatemala all the cosmopolitan parasites are present and both species of hookworm but no *Wuchereria bancrofti* or Schistosoma. According to table 76 reproduced from a Guatemalan journal ankylostomiasis is second on the list as a cause of death, coming between malaria and pneumonia. The source of *Onchocerca volvulus* in this country is not clear; it is not found elsewhere in Central and South America.

In the concluding chapter by Dr. Shattuck in which health problems are discussed the activity of the Health Services is apparent. Smallpox is so well controlled by vaccination that the mortality from it is no longer significant. The book is indexed and contains two useful maps. *A. G. Bagshawe.*

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(1322) Wt. P19/222 1875 7/39 S.E.R. Ltd. **Gp. 432.**

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